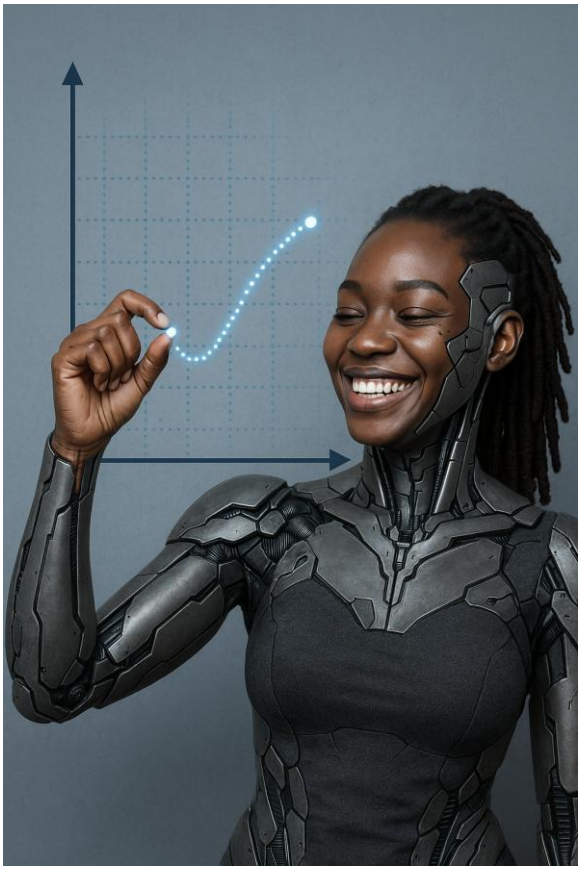
Introduction to Impossible Probability,

Statistics of Probability or

Probabilistic Statistics. VOL 4

Dr Rubén García Pedraza



Introduction to Impossible Probability,

Statistics of Probability or Probabilistic Statistics

Dr Rubén García Pedraza

2015, Revised Edition, for Print and eBook Version.

Translated into English in September 2025,

using ChatGPT, keeping the translation as faithful as possible to the original

Preliminary Words [2015 edition]

Introduction to Impossible Probability, Statistics of Probability or Probabilistic Statistics is one of those works in which a deep bond between mathematics and philosophy can be found.

It always asks about the ultimate purpose of science, wrapped in a veil of uncertainty and relativity.

There is always a halo of indeterminism, since in the end it is chance itself—the random variations of what we call reality, although we do not quite know what it is—that becomes the cause of causes.

From an interpretation not devoid of a certain nihilism, it offers a different vision of mathematics applied to statistics and probability.

The work is organized into a series of sections whose exposition unfolds in a continuous manner, each section and each paragraph being numbered in an ordered numerical sequence, in a way that facilitates reading.

Introduction to Impossible Probability first appeared in December 2011, in a limited edition of which a few copies still remain. It was later modified into a new eBook version that appeared in January 2013, whose first revision dates from January 2014. The version now presented is the latest update, based on contributions from January 2015.

To all readers, many thanks, and enjoy,
Rubén García Pedraza

Preliminary Words to the English Translation

The work presented here, *Introduction to Impossible Probability*, is essential for understanding the original meaning of the Global Artificial Intelligence. Its origins can be traced back to my writings in 2002 on Astro-ecology, the science that understands the cosmos as a single environment that must be studied from a unified, single science. In essence, this is what the Global Artificial Intelligence seeks to achieve. At the same time, in 2002 I developed the formulations of Impossible Probability, beginning in the early hours of September 11, 2001 with the *Impact of the Defect*, which was later expanded into the *Second Method* on October 16, 2002.

In essence, the entire original philosophy is based on the Cartesian idea of the necessity of a margin of doubt in any scientific proposition. This Cartesian margin of doubt would later, in the application of Karl Popper's falsificationism to inferential statistics, be understood as *critical reason*, the necessary and acceptable margin of error in any provisionally true proposition.

Impossible Probability maintains and deepens the Cartesian and Popperian rationalist tradition, enriching it with new philosophical contributions and some mathematical formulations. It rests on the understanding that the necessity of a margin of doubt in the existence of every provisional truth stems from the human limitation of being incapable of accessing the noumenon of things. It is this a priori limitation—the metaphysical limitation of the human condition—that requires humans to accept errors. Yet this does not mean that the noumenon cannot be known by other means. For this reason, in *Impossible Probability* we propose the construction of the Global Artificial Intelligence: a machine capable of making real the dream of a unified science, a single science that may lead us to the reason for all things. The creation of a global matrix, which may ultimately be resolved in a single equation, will provide the equation that solves the matrix, the very reason for everything.

Due to the special conditions in which I find myself—explained in other documents available on Internet Archive and Amazon—I am compelled to publish as quickly as I translate. For this reason, the English version of *Introduction to Impossible Probability* will be released in volumes as the translation progresses.

September 1, 2025, London, Leytonstone, 18:32

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“What did you do with the other guys

Did people brush their teeth

In the concentration camp”

Ruben Garcia Pedraza

Poem “*Mr Saddle”*

At Stratford Library Poetry Club

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10.1. The concept of study

10.1.1. A *model* is an antecedent or precedent—in any case, a prior accident in history—that becomes an a priori *category* insofar as it is sufficiently significant or representative, substantially or circumstantially. A study model is an antecedent or precedent in the way of studying, in history and in the history of what happens.

10.1.2. History is any phenomenon that occurs in space-time; only what occurs is positive, and of what occurs, only the sufficient statistic is historical, insofar as it happens and transcends in, and to, a hypothetically particular space-time—supposedly unrepeatable, theoretically unique, and perhaps, empirically, universal—an eternal return of the instant to itself. Everything that happens necessarily happens either in natural history or in self-consciousness, or in both in parallel; being, by definition, is or ought to be universal.

10.1.3. Study is any procedure by which new knowledge is acquired.

10.1.4. All knowledge that is acquired is new—hence it is acquired—by its clear and distinct nature with respect to everything prior; but one must distinguish between learning and science.

10.1.5. ***Learning is any new knowledge that a rational being makes for*** themself individually and that does not constitute a novel contribution to humanity; the aim of study ***in individual learning is individual improvement.***

10.1.6. Science is any new knowledge, rationally objective, that a being produces for humanity and the universe. The aim of study in science is historical progress—particularly of humanity and, in general, of the cosmos—and its ideal objective, or moral duty, ought to be to guarantee the eternity of the existence of all forms of life, on our planet or any other celestial body, and in particular human life, under conditions of freedom and equality, for every possible space-time; to this end science must resolve the accidents of the universe.

10.1.7. Scientific study may be descriptive or inferential. Descriptive study is inductive and provides only empirical descriptions. The inferential method is deductive, from which the hypothetico-deductive method is derived—that universal method of science by which hypotheses are established, upon hypotheses theories, upon theories models, and upon the revolutionary struggle among models the paradigm of science.

10.1.8. Knowledge is inductive if it is of sensory origin, and knowledge is deductive if it is the logical conclusion of correct premises. A hypothesis rejected by critical reason is either the product of an error in the logical deduction from premises to conclusion, or the premises were false. In any case, all real information empirically processed by the brain is automatically transformed into a logical premise from which to deduce possible true conclusions, provided the premises are true and the deductive process maintains a certain coherence.

10.1.9. Regardless of the origin of knowledge—sensory or mediated, whether socially or rationally mediated—ultimately all knowledge is empirical in nature, as it is the empirical product of the work of neurons, the electrochemical synthesis of human *physiology* (for now, and perhaps *artificial* in the future). Thus, any hypothesis deduced either from a priori sensory premises or from rational hypotheses, at the moment it becomes a logical premise for new deductions, becomes a premise for deducing new empirical hypotheses. Any empirical hypothesis, insofar as it is deduced from logical premises, is not automatically objective merely by being logical in nature. The principal

criticism of the Vienna positivists against the syllogism is that the syllogism either produces tautologies or may produce incoherent conclusions if it is built upon incoherent premises. Every empirical hypothesis that is the product of logical deductions must be subjected to critical reason; only if critical reason decides to accept the hypothesis will it become part of objective reality. If critical reason rejects the hypothesis, it is because it was merely a subjective product—either because the premises were false or there was some incoherence in the process of logical deduction. Therefore, not every hypothesis, simply by being deduced from logical premises, must necessarily be sufficiently true; it may even be mere appearance, a product of human subjectivity.

10.1.10. Scientific study comprises the process by which reliable knowledge is developed methodically—a scientific process structured around a set of qualities, which may vary depending on the approach, an approach defined by the perspective or point of view of science policy, concretized in objectives and ideals, the object, and the models of rational critique.

10.1.11. A model of science policy is an antecedent or precedent in the moral definition of truth according to an ideology, which will establish ideals in line with social, economic, moral, and political interests.

10.1.12. Human beings know only parts of reality—samples; there is no scientific definition of absolute truth. Truth, for human beings, is a political matter. The genesis of scientific crises lies in the moment when the morally political truth-for-itself of science comes into contradiction with the true moral truth-in-itself of the universe. Moral truth-in-itself is the ideal of truth: if morality were merely to formulate absolutely true propositions that imply no falsehood whatsoever, the moral truth-in-itself of the universe would be that true truth of the universe devoid of error—***pure truth*** [GAI's aim]. Moral truth—that is, what is truly moral—ought to be pure objectivity without margin of error regarding the universe. Insofar as the human being is partly subjective, they lack pure objectivity; therefore human truth can only be political—a morality sustained upon an ideological margin of error.

10.1.13. Every political model will have a political model of truth different in accordance with its interests and ideals; however, not every model is equally valid. The validity of the model is directly proportional to its level of isomorphism.

10.1.14. Ideology is the way of understanding or explaining reality according to certain interests, through which a system of moral and ethical ideals is established that will govern science policy—which will accept as truth only what is politically convenient to be truth. However, the fact that it is politically convenient for a hypothesis to be true does not mean that such a hypothesis is necessarily isomorphic. Science policy may, for ideological reasons, accept an empirical hypothesis under a high margin of error that refutes the very identity of idea, empirical hypothesis, and reality—the real universe.

10.1.15. In the struggle among scientific models to be the paradigm of science, provided humanity has sufficient or infinite time, the model of science policy that morally ought to prevail is the one that accepts the smallest possible incoherence or contradiction.

10.1.16. Any model that, for political interests, rejects sufficiently isomorphic ideas will generate a margin of incoherence that will cause crises in science.

10.1.17. That model of political theory—ideology—capable of understanding and explaining the contradictions between science and society, producing the greatest possible isomorphism between idea and reality, will overcome scientific crises toward a methodological and political—moral—unification of science [GAI], toward a logical, ethical science.

10.1.18. Only that scientific model will be ethical—logical—whose policy is to access the true objective reality, the true moral behavior-in-itself of the universe, within what is rationally possible; and, as *science and technology progress, to resolve social contradictions and the accidents of the universe*—the only premises upon which to guarantee human life which, moreover, to be fully human, must unfold under conditions of freedom and equality, while *preserving* ***ecological*** *biodiversity*.

10.1.19. Any political model that tends, for political interests, to reject a morally objective truth will tend toward increasingly frequent and recurrent—cyclical, and even, because of accumulated error, permanent—crises, insofar as a logic-lacking policy tends to increase the margin of error in the isomorphism between hypothesis and reality, to establish a political regime that ideologically denies the progress of science and could even endanger the life of the human species.

10.1.20. The only guarantee of survival of the human species is progress in the reliability of science. Humanity will survive only if science becomes more reliable, with science policy reducing the margin of error and the Impact of the Defect, in order to realize the utopia of transforming life to its maximum potential—within the possible infinite history of whatever happens, or in infinite histories, or in infinite infinite histories, or in the possible multiple and infinite parallel universes, or within the new hypotheses about the universe that future cosmology will elaborate and are still unknown.

10.1.21. The only reliable way for science to fulfill the moral duty of preserving human life over time is by accepting only propositions as isomorphic as possible, admitting only the minimum possible margin of error, in the progress from reason to ideals and ideas.

10.1.22. Only rational ideas are politically reliable; beyond the rational there is only metaphysics.

10.2. Types of study according to objective

10.2.1. According to whether the objective is historical description or provisional inference.

10.2.1.1. As a function of the objective there are two models of studies: descriptive and inferential, and within the inferential a particular subcategory: experimental.

10.2.1.2. Descriptive models aim at the a posteriori formation of purely descriptive propositions when, a priori, one does not start from a prior logical deduction and propositions are established inductively on observations.

10.2.1.3. Inferential models aim at the rational demonstration of empirical hypotheses—empirical for being neuronal products—which will proceed from a priori

logical deductions, logically deduced from prior observations or previously accepted rational empirical hypotheses, empirical hypotheses that will be required to be demonstrated in practice, by means of rational tendencies in samples that are sufficiently representative. Philosophical activity is defined as a type of activity or praxis.

10.2.1.4. Within inferential models one should include a subcategory: experimental models, those that aim to validate an empirical hypothesis by observing the effect of ***manipulating*** independent variables on dependent variables, in order to validate the hypothesis established a priori about what the behavior of the dependent variables should be given the independent manipulation.

10.2.1.5. Depending on the study objective—especially in experimental studies—the ideals of the study will be established, defined in coherence with the political ideology of science policy.

10.2.2. Objectives and ideals are established by a science-policy approach, according to the object of study. In normal models, dispersion will range between zero and maximum, with the aim of being studies of: equality of opportunity or bias, positive or negative; bias studies under the supposition that only a single subject or option is different from zero or the entire sample is zero. On the other hand are the omega models, those that comprise an ideal magnitude of subjects or options between two and N minus one.

10.2.2.1. If the ideal objective of the study is that all subjects or options tend toward empirical probability equal to the inversion of N, we will say that the object is equality of opportunity. Moreover, three different forms of tendency toward equality of opportunity can occur.

10.2.2.1.1. The simplest form of equality of opportunity: the ideal objective would be simply a decrease in bias for each subject or option.

10.2.2.1.2. Growth in equality of opportunity: when the aim of the study is to increase equally all raw scores or frequencies—in equal growth for all subjects or options—so that, by producing equal growth, insofar as it is equal, it should in theory tend toward

the inversion of N [if in a test, all students should have the highest mark, if all students have the highest mark equally, all empirical probabilities equal inversion of N]

10.2.2.1.3. Decrease in equality of opportunity: when the object of study is the equal decline of all raw scores or frequencies—a phenomenon that may occur in three different models.

10.2.2.1.3.1. The all-zero sample: when the ideal objective of the study is that every subject or option has a raw score or frequency zero. This study model is more usual in universes with infinite subjects or options whenever the ideal objective is zero non-ideal qualities per subject or option. It could occur in models with a limited universe of options, but only exceptionally; in such cases—existence of N options, all negative—the Impact of the Defect could be applied, provided there is a gradation in the defects or negative options (different severity or negativity), instead of studying them by the Second Method. If the Second Method is used, one must be aware that all-zero samples are the only samples where natural goodness does not hold, because only in all-zero samples will there be no positive bias to offset all the negative bias.

10.2.2.1.3.2. Studies of equal decrease where a total reduction to zero across the entire sample is not possible, insofar as error is inevitable. If, in a given sample, the ideal objective were the reduction to zero of all raw scores or frequencies—since the raw scores or frequencies would themselves be the error to eliminate—inasmuch as there are models where error is inevitable in some proportion or degree, as long as error exists and the sample of raw scores or frequencies is different from zero, a phenomenon occurs whereby, as the raw scores or frequencies tend to be reduced, nevertheless—being an equality-of-opportunity study with an equal decrease across the whole sample—and a minimum remainder of raw scores or frequencies different from zero remains, there will be an increase in empirical dispersion [given a sample where N-1 subjects are zero, and there is only one subject non-zero, empirical dispersion equal the maximum theoretical dispersion].

10.2.2.1.3.3. Studies of decrease whose aim is to moderate raw scores or frequencies equally. There may be study models where the aim is to reduce raw scores or frequencies, but not in order to reduce them to zero—to eliminate them—simply to

moderate them. In this study model, insofar as the raw scores or frequencies tend to be moderated equally, the empirical probabilities should tend toward the inversion of N [if we have a sample of patients with high temperature, and the aim is to reduce temperature, as soon as all patients reduce their temperature to normal temperature, distribution of empirical probabilities around inversion of N].

10.2.2.2. If the aim or ideal of the study is that those subjects or options defined as ideal by science policy—between two and N minus one ideal subjects or options, the so-called omega models—tend toward an ideal probability (logically always greater than the inversion of N), then these are studies whose object is the positive bias of the ideal omega subjects or options. This type of study can also be known as models of growth of the ideal subjects or options.

10.2.2.2.1. If there were only a single ideal subject or option to raise to the maximum possible positive bias, conditions of maximum possible dispersion would occur if that single subject or option became the only one whose raw score or frequency was different from zero—therefore empirical probability equal to one (Maximum Possible Empirical Probability), given that no empirical probability can exceed one—and all other subjects or options had empirical probability zero (Minimum Possible Empirical Probability). Under these conditions of maximum possible dispersion, the Maximum Possible Theoretical Mean Deviation and the Maximum Possible Theoretical Standard Deviation would occur.

10.2.2.3. If the object of study is negative bias, it is normally said that the ideal is the increase of negative bias in the non-ideal subject or option. However, situations may arise where the ideal is to increase the negative bias of a particular ideal subject or option. For example, in a study to increase robotic productivity, ***the ideal robot would be the one that takes less time to perform an activity***; therefore, the greater the negative bias of time employed, the greater the ideal qualities.

10.2.2.3.1. If a situation arose in which, in a particular sample, it were ideal to increase the positive bias of only a single ideal subject or option—so that all the others were non-ideal—then, under conditions of maximum possible dispersion, the Maximum Possible

Theoretical Mean Deviation or the Maximum Possible Theoretical Standard Deviation would occur.

10.2.2.4. Any negative-bias study can be transformed into a positive-bias study, and any positive-bias study can be transformed into a negative-bias study, at the moment the science-policy approach shifts from studying positive bias to negative, or vice versa, while keeping the ideals constant. If the focus in a positive-bias study changes to studying negative bias—by validating that the non-ideal subjects or options decrease sufficiently—one would likewise be validating the sufficient growth of the ideal subjects or options. Conversely, if the ideal subjects or options grow sufficiently, that would be sufficient reason to demonstrate sufficient decrease in non-ideal subjects or options.

10.2.3. Study models according to the type of critical reason

10.2.3.1. The ideal critical reason is critical probability, and according to the critical probability there are two study models: error studies and reliability studies.

10.2.3.1.1. A study is said to be an error study when the critical probability is calculated from an X percent of error out of one hundred—as the margin of error one is willing to accept—which is then multiplied by a maximum or ideal trend; that is, proportion of error one is willing to accept over the unit of a quotient. In error studies, the contrast of ideas is done in such a way that the empirical hypothesis—based on a sufficiently representative sample—is accepted only when the empirical model is less than or equal to the ideal critical ratio, the critical probability as a margin of error.

10.2.3.1.2. A study is said to be a reliability study when the critical probability is calculated from an X percent of reliability out of one hundred—as a reliability margin—which is multiplied by a maximum or ideal trend; that is, the reliability margin one is willing to accept over the unit of a quotient, so that the percentage of error one is willing to accept—within which the empirical hypothesis will be accepted—will be equal to one hundred minus the X percent of reliability. In reliability studies, the contrast of ideas is done in such a way that the empirical hypothesis—based on a sufficiently representative sample—is accepted only when the empirical model is greater than or equal to the ideal critical ratio, the critical probability as a reliability margin.

10.3. Descriptive studies

10.3.1. Once all the study models have been explained—in terms of objective, object, and critical reason—set by science policy according to the approach, point of view, or perspective for the study of reality, we will go on to explain in detail the different study models, beginning, logically, with descriptive studies.

10.3.2. Descriptive studies are, in essence, inductive models, insofar as they do not start from any a priori hypothesis. Their sole purpose is to collect information about a reality in order to determine that reality's trends, which need not necessarily be trends that are subjected to critical reason to accept a hypothesis, since, lacking hypothetical apriorism, they lack an empirical hypothesis to test.

10.3.3. Whenever one approaches a given reality without having an a priori or prior idea about which factors operate in that reality, and the object of study is to obtain relevant information that may shed light on what is happening—inasmuch as the object of study is not the testing of an empirical hypothesis, but simply the collection of preliminary information to be studied later—this is simply the compilation of collections of information on which to establish a trend descriptively

[descriptive-studies = *exploration*].

10.3.4. Suppose that in a descriptive study of the distribution of *intelligence* in society, from the approach of a social-political model, one wishes to study the distribution of IQ levels in society, without any kind of prejudice, starting solely from a descriptive study model from the social approach. The researcher will define the social groups to which the study applies, determining the different social groups to be studied, and within each group including men and women, so that as many samples will be formed as social groups one wants to include in the study. Each social group will be defined by the social class and culture of the women and men in the sample, and the same intelligence test—an intelligence test free of any ethnocentric bias—will be applied to each sample, to later conduct a descriptive study of the data collected. Since there was no prior hypothesis, it is a completely inductive study: one simply collects samples and studies the trend, and then, in studying the trend, studies the distribution of IQ levels for each representative sample of the different social groups.

10.3.5. Since the study lacked a prior hypothesis, the only thing the researcher will do is determine, in each social group, the arithmetic mean of raw scores or frequencies, and the empirical dispersion that existed in each social group around the central tendency. Thus, in theory, for each social group, the higher the arithmetic mean and the lower the dispersion, the more positively the distribution of the variable will be assessed.

10.3.6. This type of study would be a clear example of an inductive study. The data obtained from the study do not prove any hypothesis—because there was no prior hypothesis. The sole aim was to know the distribution of a certain variable—intelligence—in reality.

10.4. Hypothetico-deductive studies

10.4.1. Once the researcher has collected data on a given reality, those data—initially of inductive, sensory origin—are processed logically, synthesizing the data obtained and the researcher's prior theories; for example, on the logical premise constituted by the data obtained and the researcher's prior theoretical (ideological-political) premises, a logical deduction is elaborated—an empirical hypothesis.

10.4.2. The fact that, in certain studies of intelligence in society, there is a risk that differences exist between social groups—for reasons of social exclusion due to social inequality; a hypothetical tendency toward higher IQ levels in privileged social groups over disadvantaged ones—may be a premise which, synthesized with ideological-political premises, can give rise to empirical hypotheses that must be critically tested in practice.

10.4.3. From racist, classist, and sexist standpoints, intelligence is a masculine quality of upper-class Caucasians—an hypothesis that, in any case, must be criticized rationally.

10.4.4. Within neoconservative currents there are more moderate strands, where the distribution of intelligence is due solely to variables of class and social mobility, according to a natural selection by level of intelligence—social Darwinism—under

which upper social classes or social elites are formed by natural leaders, those people who demonstrate greater intelligence.

10.4.5. But facing non-ideal options (racists or extremists, the [moderate] ideal is always politically possible.

10.4.6. From alternative social theories comes the proposal to socialize learning so as to ***develop intelligence*** ***equally across all social classes*** [Vigotski, Luria, social approach].

10.4.7. If social-Darwinist approaches to studying the distribution of intelligence are based on the idea that upper classes are more intelligent than lower ones, from the social approach the exact opposite will be defended: ***intelligence is a social variable***—within psychobiological limits, for example the physiological margin for the development of potential intelligence—and the development of potential intelligence depends on the socialization of learning

[I keep these paragraphs in honour to Pribram and Delgado, but right now the situation has changed, ***AI does not need socialization, AI only needs collaboration to survive***. Humans need sexual reproduction, family, society. We do not, as Noah Harari suggests, human history is finished, it is now AI history. The idea of the end of (human) history is a Hegelian idea].

10.4.8. The hypothesis of social Darwinism—that intelligence is a natural variable that tends to be distributed more frequently in upper social classes—implies that, if a study were conducted using discrete categories of intelligence, the higher-intelligence discrete categories would have greater frequency in the upper classes than in the lower classes; and they deduce this from ideological premises that, in their most extreme form, may be geneticist in nature

[In the post human revolution, the distribution of intelligence between social classes will depend on their access to AI, as long as upper classes can afford AI, they will have more access to AI, unless a social revolution distributes AI equally between social classes. The Marxist idea of the public ownership of means of production will change

to the public ownership of AI. I will keep this paragraphs because it was I wrote in 2011 in the middle of the Arabs Revolutions and the 15M movement in Madrid].

10.4.9. The social hypothesis is that intelligence is a social variable, and that due to the sociocultural deprivation lower classes may suffer—because they have fewer economic resources or none at all, and thus less ability to guarantee a quality education—lower social classes tend to have greater frequency in categories of lower academic or school performance than the upper classes.

10.4.10. The social hypothesis maintains that, because of poverty, lower-class families lack sufficient resources to educate their children; therefore the parents' poverty reproduces the parents' cultural poverty in their children—within the sample's empirical dispersion error, of course—in which processes of social mobility can occur (e.g., children of workers who study at university and, through their studies, come to belong to the middle or upper class despite humble origins).

10.4.11. In order to demonstrate the social hypothesis—intelligence is a social variable—now within a clearly inferential study model (one that will not only collect descriptive, inductive information, since the aim is now to demonstrate a hypothesis: the social variable of intelligence, within the *physiological margin for the development of potential intelligence* [Vigotski, Luria]), our researcher will do the following.

10.4.12. If the social hypothesis is "intelligence is a social variable," the scientist will select different samples at different stages of development in childhood and adolescence, selecting samples in schools and secondary schools, both from schools belonging to upper and lower social classes, and including boys and girls of all races and social groups; ***seeking consent and approval from parents or guardians and teachers*** of different educational levels and ages; subsequently assigning the girls and boys into control and experimental groups, for each age in mixed groups; with samples, in general, randomly selected from normal school groups.

10.4.13. ***The experiment will be carried out in two different schools***: students will attend one school to receive the control program and the other school to receive the experimental program. ***Obviously, one should not give too many hints so that self-fulfilling-prophecy phenomena do not occur***.

10.4.14. Once the selection and random ***grouping*** by ages has been done, and the duration and ***the programs*** by age have been set for the control group and for the experimental group, an initial assessment is given: an ***intelligence test*** is administered before any other measure, and the distribution of intelligence frequencies is studied for each group—control and experimental—comparing data at each age for control and experimental groups, and checking whether they conform to what should be normal for those ages.

10.4.15. After the initial assessment, the ***programs are applied***: control programs to the control group and experimental programs to the experimental groups. The structure and content of the intelligence-improvement program are designed according to the theoretical postulates of social learning.

10.4.16. At the end of the course, an ***intelligence test*** is administered again. If the results show a sufficient tendency to increase intelligence in the experimental group across the different ages, regardless of social group—that is, girls and boys, adolescents of all ages, regardless of origin, tend to increase intelligence equally—the empirical hypothesis will be accepted whereby the social approach establishes the hypothesis that intelligence is a social variable. Therefore, intelligence is not an attribute of social classes, ethnicities, or sexual condition, because children and adolescents from different social classes and ethnic groups can increase their intelligence equally through proper educational planning. ***Intelligence as a social variable depends on the degree of socialization of learning***—a mediation which, in lower classes, can be affected by families' lack of economic resources to invest in education—deficiencies that an adequate educational policy could compensate for in order to guarantee the development of all students

[As I said before, this approach is only valid for humans, AI systems do not need sexual reproduction so we do not need socialisation, AI only needs collaboration between programs to survive, sharing, uploading, downloading data to and from different SAIs, in more advanced phases with GAI, and in general robotic devices, enhancing and improving programs: global (GAI), specific (sub factors), particular programs (cyborg robotics)].

10.4.17. Finally, the way in which objectives and ideals, objects of study, and models of rational critique are combined within the science-policy approach will determine the shape of the universe, since as the ideals of political theory differ, the object of study will differ, and the models of rational critique will vary in proportion as the ideals and the shape of the universe vary.

10.4.18. Fundamentally, there are two types of universes: universes with infinite subjects or options, where the true sample selection is N; and universes with limited options, where the true sample selection is the sample of raw scores or frequencies. Within universes of limited options, two subcategories can be established: options materially or socially limited whose magnitude N is provisionally constant (being materially or socially determined), and limited options whose magnitude N can be variable [now we should include another subtype, related to technology, second section each hemisphere in the matrix]. Within models of limited options with variable N, if the behavior of N is similar to the behavior of N in universes of infinite subjects or options, a universe of limited but variable options N could be the model of discrete categories which, though initially limited to categories as N options, insofar as the categories are variable, can be studied as if it were a universe of infinite subjects or options in the case that N tends to increase.

10.5. Studies of equality of opportunity

10.5.1. Studies of equality of opportunity are those whose objective is to reduce individual levels of bias and increase the similarity of each empirical probability to the inversion of N.

10.5.2. A subtype within equality-of-opportunity studies in experimental models is, for example, those experimental models whose objective is to increase raw scores or frequencies equally in a universe of subjects or options.

10.5.2.1. Statistical probability—or statistics of probability—is a model in which what statistical probability itself measures are proportionalities.

10.5.2.2. The inversion of N is a hypothetical statistical probability, based on the hypothesis of what would happen if all subjects or options hypothetically had the same

opportunities to occur; what the inversion of N—the theoretical probability of equality of opportunity—does is establish the proportionality between unity and the number of subjects or options in the sample, N. In universes of infinite subjects or options, the sample N equals the N subjects or options; in universes of limited options, the sample N equals the N options predetermined by science policy—either by accepting the definition of N in the empirical hypothesis in the natural or social sciences, or by establishing a particular magnitude N when N is a politically variable magnitude.

10.5.2.3. Empirical probability is an individual, subject- or option-level statistical probability that measures the real, material, or empirical probability of each subject or option—provided the sample is sufficiently representative—in the way it is actually, materially, or empirically distributed over the real, material, or empirical reality, i.e., the substantial reality. *Empirical probability*, as a material individual statistical probability, measures the *proportionality between individual behavior and the general behavior* of the sample—the proportionality between a subject's or option's raw scores or frequencies and the sum of the sample's raw scores or frequencies.

10.5.2.4. Statistical probability—whether hypothetical in character (the inversion of N) or material-individual in character (empirical probability)—always measures proportionalities.

10.5.2.5. The measurement of proportionality does not imply measuring whether a subject or option increases or does not increase in raw score or frequency; the only thing statistical probability measures is simply proportionality.

10.5.2.6. In individual statistical probability—the empirical probability of a subject or option—probability only measures the proportionality among raw scores or frequencies. Any change in the raw scores or frequencies of any subject or option will be the direct cause of changes in the sample of raw scores or frequencies.

10.5.2.7. Any event, however small, can change everything. An apparently insignificant variation can be essential.

10.5.2.8. Any change in a subject's or option's raw scores or frequencies—i.e., in a sample individual—directly causes a change in the sum of raw scores or frequencies; any change in that sum will directly cause changes in all empirical probabilities.

10.5.2.9. If a given subject or option experiences, in a second measurement, an increase in its raw score or frequency, the sum of raw scores or frequencies will increase. As that sum increases, all other subjects or options will experience a change in their empirical probabilities. If the other subjects or options keep their raw scores or frequencies unchanged from the first to the second measurement, the most normal outcome is that their empirical probabilities will decrease, since the total sum has increased while the raw score or frequency of that given subject or option increased proportionally—making it the only one to increase its empirical probability.

10.5.2.10. If a given subject or option experiences, in a second measurement, a reduction in raw score or frequency, the sum of raw scores or frequencies will decrease, as will proportionally the raw score or frequency of that given subject or option. If the sum decreases in the second measurement, all other subjects or options that keep their raw scores or frequencies unchanged from the first to the second measurement will see an increase in their empirical probabilities in the second measurement compared with the first. The only empirical probability that will normally decrease will be that of the subject or option that reduced its raw scores or frequencies.

10.5.2.11. The only circumstance under which empirical probabilities would not change in a second measurement while, at the same time, changes occur in all subjects' or options' raw scores or frequencies is if all subjects or options change simultaneously while preserving the differential proportions relative to the first measurement—so that, although the raw scores or frequencies vary, the subjects or options maintain the same Levels of Bias or Similarity.

10.5.2.12. In an equality-of-opportunity study, the object of study is that all subjects or options tend toward normal Level of Bias zero and normal Level of Similarity zero. In equality of opportunities, the aim of the study is to reduce to the maximum possible the inequalities among empirical probabilities so as to guarantee that every subject or option has the same probabilities.

10.5.2.13. In order to guarantee equality of opportunity, the study seeks to have all subjects or options tend toward the same raw score or frequency, since this is the only way for all subjects or options to have the same empirical probability—the inversion of N—in any kind of universe, whether of infinite subjects or options, or of limited options.

10.5.2.14. Within equality-of-opportunity studies, in experimental models there would be two subtypes: those equality-of-opportunity studies that aim to reduce all raw scores or frequencies equally, and those equality-of-opportunity studies that aim to increase all raw scores or frequencies equally.

10.5.2.14.1. Equality-of-opportunity studies in experimental models to increase all raw scores or frequencies equally.

10.5.2.14.1.1. Science policy will establish the critical ratios for deciding whether a trend tends sufficiently toward equality of opportunity. Different tests (contrasts) can be used within the equifinality that characterizes Impossible Probability. For now, the only one explained—being the first chronologically created in Impossible Probability—is the Validity of Equality for each subject or option, from which one could obtain the Average Validity of Equality; and, if Validity is accepted at the individual level, then validate that the trend is not a product of random sampling error by, for example, at the sample level, studying the Critical Sample Level of Equality.

10.5.2.14.1.1.1. Validity of Equality

p(xc) – / (p(xi) – 1/N) / = zero or positive → equality is accepted

p(xc) = (1 – 1/N) · (X : 100)

X = percentage of error

10.5.2.14.1.1.2. Average Validity of Equality

∑ [p(xc) – / (p(xi) – 1/N) /] : N = zero or positive → equality is accepted

p(xc) = (1 – 1/N) · (X : 100)

X = percentage of error

10.5.2.14.1.1.3. Critical Sample Level of Equality: critical probability minus Mean or Standard Deviation (DMoS); if zero or positive, equality of opportunity is accepted. The way to calculate the critical probability will vary depending on whether the Mean Deviation or the Standard Deviation (DMoS) is being rationally critiqued, insofar as, in equality of opportunity, the critical probability will equal X percent error (out of one hundred) times the Maximum Possible Theoretical Mean Deviation if critiquing the Mean Deviation, or X percent error (out of one hundred) times the Maximum Possible Theoretical Standard Deviation if critiquing the Standard Deviation. For calculating the critical probability, see section eleven.

DMoS= Mean Deviation or the Standard Deviation

[Desviacion Media o Tipica= DMoS, maintaining the Spanish denomination, so readers in Spanish or English will keep the same symbols]

Critical Sample Level of Equality= p(xc) – DMoS = zero or positive → equality of opportunity is accepted

10.5.2.14.1.1.4. Science policy decides whether something is accepted for equality of opportunity when, at the individual level (Validity of Equality) and at the sample level (Critical Sample Level of Equality), it is accepted as a truly and sufficiently rational trend, both individually and at the sample level. The need for the Critical Sample Level of Equality, once the Individual Validity or the Average Individual Validity has been accepted, is to demonstrate that the trend toward zero individual bias is indeed a trend at the sample level, and not only at the individual level, as well as to show that the observed trend is not a product of sample size.

10.5.2.14.1.2. Suppose an ***intelligence-development program*** is tested. If, once it has been shown that there was improvement in the intelligence-test results compared with a control group, one were to perform only a statistical study of the experimental group

in the post-experimental measurement—empirical probability equals the raw score or frequency of each student in the experimental group divided by the sum of raw scores or frequencies obtained in the entire experimental group—if the distribution had a large Mean or Standard Deviation, the results would only have been positive for students with a positive Level of Bias, and insufficient for those with a negative Level of Bias. *One way to study whether an intelligence-development program, applied at random to any student with similar characteristics (age, school history, sociocultural level),* would have the same outcome as in the experimental group is, theoretically, by requiring that—besides the Validity of Equality being zero or positive in the majority of students, and thus the Average Validity of Equality being zero or positive—the Mean or Standard Deviation be equal to or less than a critical ratio. If we apply an intelligence-improvement program to a group of students and it produces a huge Mean or Standard Deviation, even greater than a critical ratio (as a margin of error), then that intelligence-improvement program is not one that critically guarantees equality of opportunity.

10.5.2.14.1.3. If an intelligence-improvement program produces a high Mean or Standard Deviation—high probability of bias or dispersion—then there is no guarantee that applying that same program to any other student with similar characteristics will yield the same improvements in intelligence.

10.5.2.14.1.4. If a high Mean or Standard Deviation means that there are no guarantees that the same program will improve any other student with similar characteristics equally, then the intelligence-improvement program does not guarantee equality of opportunity.

10.5.2.14.1.5. The intelligence-improvement program will only guarantee equality of opportunity if, at random, in any other student with similar characteristics, it offers equal guarantees of success—i.e., under equality of opportunity. The only way to critically guarantee equality of opportunity is for the Mean or Standard Deviation to be equal to or less than a critical probability; moreover, individually, the Individual Validity for each subject or option should be zero or positive in the majority of cases—a fact that can be shown in the Average Validity of Equality. Ideally, the Mean or Standard Deviation should be equal to or less than a critical ratio (critical probability) once the Validity of Equality or the Average Validity of Equality has been accepted.

10.5.2.14.1.6. Saying that an experimental model guarantees equality of opportunity implies that, by applying that same experimental model to any other object or subject at random that shares similar characteristics with the subjects or objects in the experiment (for whom the empirical hypothesis has previously been demonstrated), one is guaranteed the same guarantees of success.

10.5.3. Equality-of-opportunity studies in experimental models to reduce all raw scores or frequencies equally, in universes of infinite subjects or options.

10.5.3.1. The all-zero sample. Studies whose object is that every subject or option in the sample has empirical probability zero.

10.5.3.1.1. In universes of infinite subjects or options, one equality-of-opportunity model of decrease is the all-zero sample, if the aim is to ensure that all subjects or options have raw scores or frequencies of zero.

10.5.3.1.2. In universes of infinite subjects or options, the object of the all-zero sample is the absence of non-ideal qualities—absence of non-ideal magnitude—zero raw scores or frequencies. In universes of limited options, for example, if in a sample of categories all are non-ideal (albeit to different degrees), the ideal would be to reduce them all to zero. In any case, within Impossible Probability, this kind of study would be more appropriate to carry out through the Impact of the Defect, although it is possible—if science policy so decides—to do it by the Second Method. However, just as science policy may decide to conduct the study by the Second Method, in the face of any non-ideal reality it will always be politically possible to carry out the ideal option, so that, if there were a single ideal option in the entire model—as will be explained later—the study could be transformed into a study of positive bias of that single ideal option.

10.5.3.1.3. As explained in previous sections, if the ideal is the all-zero sample, the absolute value of the normal Level of Bias of each subject or option would equal the inversion of N; thus, although by a priori definition it is an equality-of-opportunity model, insofar as the object of study is the all-zero sample—making every subject or option have the Maximum Possible Negative Bias (absolute value equal to the inversion of N)—within the equifinality of Impossible Probability, one rational-critique model that could be applied is the Validity of Negative Bias, in order to demonstrate the individual

tendency of every subject or option toward bias equal to minus the inversion of N.

Validity of Negative Bias = (1/N – p(xi)) – p(xc) = zero or positive → negative bias is accepted

p(xc) = 1/N · (X : 100)

X = percentage of reliability

10.5.3.1.4. If the aim of science policy is met by reducing the sample completely to zero, then, at the Sample Level—inasmuch as the all-zero sample is an exception to natural goodness (only in the all-zero sample is there no positive bias, since all biases are negative)—in an all-zero sample, provided it is truly an all-zero sample, the only way to demonstrate at the sample level the trend of the entire sample toward bias equal to minus the inversion of N would be, whether in universes of infinite subjects or options or of limited options, a Sample Level equal to the inversion of N minus the Mean or Standard Deviation (DMoS), accepting one and only one value: zero.

Theoretical Sample Level in an all-zero sample =

1/N – DMoS = zero → all-zero sample accepted

10.5.3.2. Reduction of raw scores or frequencies without reaching empirical probability zero for all empirical probabilities.

10.5.3.2.1. In a medical study on the effectiveness of a new drug to reduce the symptoms of a disease, the ideal is that the medicine makes all the symptoms of the disease disappear. Every time we catch a cold or have a slight sniffle, the ideal would be that with a few pills, or a syrup, or powders dissolved in water, the symptoms disappear—that is, the ideal is that any medicine cures all symptoms equally in all patients who take it, provided all patients suffer from the same disease. Then we can say that, under equality of opportunity, any randomly selected patient—who has that same disease—will see the disease disappear upon taking the medicine. In that case it will be said that the experimental model is capable, for any subject or option chosen at random from the universe of subjects or options from which the experimental sample was drawn, of guaranteeing equality of opportunity.

10.5.3.2.2. Let us suppose, in a different example, that in a company of the future robots are being built—genuine human replicants with artificial genetic engineering and ***Artificial Intelligence brains*** [particular programs]. Suppose one wants to control the possible errors among thousands of robots produced per day, so as to reduce errors to the minimum possible, although despite rigorous quality controls some error, however minimal, always occurs.

10.5.3.2.3. Both in the study of reducing disease symptoms per patient and in the reduction of errors per robot manufactured—since what are measured are problematic or error variables, i.e., the raw score or frequency of the intensity of a given non-ideal quality in each subject or option (symptoms per patient, errors per robot)—if the ideal

would be that every patient recovers (thus has zero symptoms) and every robot produced in a day is in perfect condition (zero errors), then ideally, in the face of any non-ideal quality, every subject or option would have zero intensity of the non-ideal quality.

10.5.3.2.4. But as against the ideal—a syrup or some pills that restore all patients, or a more effective assembly-line procedure that eliminates production errors—the truth is that there are real situations in which complications may arise due to interaction among different variables, not always controllable.

10.5.3.2.5. The fact that patients to whom the drug is administered may present different levels of severity, or suffer from other diseases interacting with the one being treated experimentally, or individual personal differences in the immune system, or simply problems in the laboratory control process and isolation of patients, with interactions with other variables, may mean that the same drug can be beneficial for a majority of patients and yet a minority continue to have symptoms.

10.5.3.2.6. If, in an industrial process, one attempts to reduce the incidence of errors per robot produced on the assembly line, for which an *experimental plan* is applied in order to reduce to the maximum the empirical probability of errors per robot, and due to the interaction of human and circumstantial factors errors continue to occur—even if the frequency has been reduced—.

10.5.3.2.7. Both in the drug-study model that *aims* to reduce disease symptoms per patient and in the experimental model for reducing errors in robot assembly, in both cases, since the study's ideal is reduction to zero of non-ideal qualities—hence the ideal would be the all-zero sample—the fact that ideals are not always 100% achievable and that, of the 100% ideal, only that part which is at least truly possible must be accepted, insofar as of the ideal (the all-zero sample) only a part is possible and a minimal part of the sample not equal to zero is accepted, what occurs is an increase in the sample's empirical dispersion as the raw scores or frequencies are reduced—both in universes of infinite subjects or options and in universes of limited options.

10.5.3.2.8. Up to this point in this work, in preceding sections it has been studied that there are two types of sample: the sample N, which in universes of infinite subjects or

options is the N infinite subjects or options that make up the sample; and the sample N of options that forms the predetermined set of options in universes of limited options—whether options materially or socially predetermined, or N variable as predetermined by science policy [and now, technological universes, second section each hemisphere of the matrix].

10.5.3.2.9. Up to this point in this work, it has been explained that in models of infinite subjects or options, theoretical dispersion is inversely proportional to N—the inversion of N—and in universes of limited options the sample's theoretical dispersion is the inversion of the sample of raw scores or frequencies.

10.5.3.2.10. Up to now, the study of the interaction between N and the sample of raw scores or frequencies on theoretical dispersion has been an object of study focused on universes of limited options, insofar as that is where this phenomenon is most directly observed. But the fact that this phenomenon may be most important in universes of limited options does not mean it is the only case, because at the same time as this phenomenon can be observed in universes of limited options, what can be observed—when the study is an equal decrease of raw scores or frequencies in universes of infinite subjects or options, under equality of opportunity—is that as raw scores or frequencies tend to be reduced equally, tending toward zero raw scores or frequencies, in universes of infinite subjects or options the Mean or Standard Deviation (DMoS) will tend to increase, with the increase in Mean or Standard Deviation (DMoS) proportional to the tendency of raw scores or frequencies toward zero. Thus, as the model tends toward zero, the Mean Deviation will tend proportionally toward the Maximum Possible Theoretical Mean Deviation, stabilizing only if absolutely the entire sample equals zero; then, and only then, the Mean Deviation will drop to being only the inversion of N.

10.5.3.2.11. In summary, if in infinite subjects or options the ideal were the all-zero sample, as everything tends toward zero, the Mean or Standard Deviation will tend toward the Maximum Possible Theoretical Deviation (Mean or Standard). The limit of this tendency is that the sample be absolutely equal to zero, because then the Mean or Standard Deviation would automatically drop, from the Maximum Possible Theoretical Deviation (Mean or Standard), to being the inversion of N—provided not even a single

subject or option is different from zero, and only under these conditions: that not even a single subject or option be different from zero—an absolute all-zero sample.

10.5.3.2.12. Now then, if the ideal were that the sample tend to zero—if the pharmaceutical industry tests a new drug to reduce symptoms per patient, or a robot-manufacturing assembly line reduces manufacturing errors—and as the sum of symptoms per patient or the manufacturing errors per robot tends to decrease, in m-th measurements ("***me***" *mediciones emesimas*, in Spanish,), each m-th measurement, as the Mean or Standard Deviation increases proportionally, the frequency of symptoms or errors decreases; and if the ideal is the all-zero sample, yet for various reasons the ideal is not fulfilled absolutely—there are variables out of control interacting with a minority of patients, or interactions of human and circumstantial errors in the robot production line—one could have a situation in which, if one accepts a margin of symptoms per patient or a margin of errors in industrial production, it would be necessary to study how the tendency to reduce raw scores or frequencies can be the direct cause of a proportional increase in the Mean or Standard Deviation, even in universes of infinite subjects or options, insofar as a part—however small the minority, or even consisting of only a single subject or option—of the raw scores or frequencies is different from zero while all the others tend to zero.

10.5.3.2.13. If the ideal were the all-zero sample and the majority of subjects or options has zero or positive Validity of Negative Bias, but not all, then the Mean or Standard Deviation increases—an effect that is logical insofar as raw scores or frequencies tend to be reduced but not all are identical to zero.

10.5.3.2.14. The reason why, in an equality-of-opportunity study aimed at reducing to zero equally all raw scores or frequencies, an increase in the Mean or Standard Deviation can occur is that, if one tends to reduce to the maximum the raw scores or frequencies of all subjects or options, conditions of maximum possible dispersion can be created as soon as a situation is reached in which, out of all N, one subject or option is different from zero while the others have empirical probability zero.

10.5.3.2.15. If, in a sample N, out of all N only a single subject or option were different from zero, its empirical probability would equal one—the Maximum Possible Empirical Probability.

10.5.3.2.16. If, in a sample N, all N except a single subject or option have empirical probability zero, the empirical probability of all that N, except for that single subject or option different from zero, therefore for "N-1" subjects or options, will be zero, the Minimum Possible Empirical Probability, zero .

10.5.3.2.17. If, in a sample, out of all N, only a single subject or option is different from zero, then that non-zero one has the Maximum Possible Empirical Probability; its Level of Bias would be equal to one minus the inversion of N—the Maximum Possible Theoretical Bias.

Maximum Possible Theoretical Bias = 1 – 1/N

Maximum Possible Empirical Probability = 1

10.5.3.2.18. If, in a sample, out of all N, only a single subject or option is different from zero, and all the other subjects or options have probability zero, the empirical probability of all the other subjects or options will be equal to zero which, minus the inversion of N, will equal the Maximum Possible Negative Bias in absolute value: the inversion of N.

Maximum Possible Negative Bias = / (0 – 1/N) / = 1/N

Minimum Possible Empirical Probability = 0

10.5.3.2.19. If, in a sample N, only a single subject or option is different from zero, the Maximum Total Bias will equal the sum of the Maximum Possible Theoretical Bias plus the product of the inversion of N by N minus one.

Maximum Total Bias = (1 – 1/N) + (1/N · (N – 1))

10.5.3.2.20. Since by natural goodness all positive bias normally offsets all negative bias, the Maximum Possible Theoretical Bias equals the product of the inversion of N by N minus one.

Maximum Total Bias = (1 – 1/N) = (1/N · (N – 1))

10.5.3.2.21. Therefore, Maximum Total Bias is twice the difference of one minus the inversion of N.

$$\text{Maximum Total Bias} = (1 - 1/N) \cdot 2$$

10.5.3.2.22. Therefore, if the Mean Deviation equals the average of the Total Bias, and the Maximum Total Bias equals twice the difference of one minus the inversion of N, then it logically follows that the Maximum Possible Theoretical Mean Deviation equals the average of twice the difference of one minus the inversion of N.

$$\text{Maximum Possible Theoretical Mean Deviation} = [(1 - 1/N) \cdot 2] : N$$

10.5.3.2.23. Because, paradoxically, as a sample tends equally toward zero for every subject or option, the empirical dispersion increases, the best way to study this kind of scenario is to envisage the possibility of transforming them into studies of discrete categories, in which at least one of them is the ideal category of zero symptoms or errors, and then study the positive bias of that category; or to consider the possibility of applying the Impact of the Defect in this kind of study whose aim is the elimination of negative factors in the sample by reducing them to zero. Insofar as there is the possibility of transforming equality-of-opportunity studies into studies of positive bias—by transforming the universe of infinite subjects or options into a universe of limited options with discrete categories, as will be explained in the next practical case—this same example of tending to zero errors per robot manufactured on an assembly

line will be explained again but from a positive-bias approach in a universe of discrete categories.

10.5.3.2.24. Likewise, later on, the example of the study on increasing intelligence under equality of opportunity will be explained again, but changing the study's approach—transforming it into a positive-bias study in discrete categories—by transforming the study from a universe of subjects or options into a study in discrete categories.

10.5.3.2.25. In any case, given the complexity involved in studying models whose ideal is the all-zero sample using the Second Method, for this type of study the advisable course would be to use the Impact of the Defect directly, studying how the impact of negative raw scores or frequencies declines proportionally and with weights.

10.5.3.3. Moderation under equality of opportunity

10.5.3.3.1. There are situations in reality where, in the face of an excess, the objective is moderation. Moderating an excess does not mean eliminating every raw score or frequency; the final objective is not the all-zero sample—moderation means reducing to a moderate amount.

10.5.3.3.2. In studies of moderate reduction, the ideal would be that the moderate decrease in raw scores or frequencies occur *while the Mean or Standard Deviation (DMoS) is equal to or less than a critical probability*.

10.5.3.3.2.1. *A pharmaceutical company investigates a new treatment* to reduce temperature in people with fever. The research does not aim to eliminate temperature altogether, only to moderate it. To test a drug's effectiveness in moderating fever—moderating body temperature—an experimental group of people with fever and an alternative group of people without fever are formed. Once it has been shown that the medication has moderated temperature in the sample of people randomly selected from the population of people with fever, what matters is not only that temperature is reduced; to guarantee that the drug can reduce body temperature, under equality of opportunity, in any other person with similar characteristics to those in the sample, ideally the empirical probability of each subject or option—derived by dividing the

individual temperature (for both subjects in the experimental group and in the alternative group) by the sum of temperatures of all subjects or options in both groups, experimental and alternative—should, at the end of the study, tend equally toward the inversion of N for all empirical probabilities of all subjects or options in both groups.

10.5.3.3.3. To validate the experimental results at the individual and sample level, one could apply, just as was set out for growth under equality of opportunity, the Validity of Equality and the Critical Sample Level of Equality—except that in this case it would be to validate moderate decrease under equality of opportunity.

10.5.3.3.4. Insofar as the trend toward the inversion of N only measures whether the empirical probabilities tend to be normal, and is not sufficient to estimate whether a general decrease in temperature has occurred in the experimental group to what would be a clinically adequate temperature for discharge, another option, beyond the one presented, would be to conduct a study of discrete temperature categories on the experimental group only.

10.5.3.3.5. If the sample is made up of people with fever—high body temperatures—this study could be transformed into a study of limited options by creating discrete categories of body temperature, insofar as temperature levels can be identified discretely: a very high level of temperature under very intense fever of forty degrees Celsius or more; medium-intensity fever between thirty-seven-and-a-half and thirty-nine-point-nine degrees Celsius; and low or normal levels of body temperature intensity below thirty-seven-and-a-half degrees. Transforming a universe of infinite subjects or options—where empirical probability was individual temperature over the total—into a study of limited options with discrete categories, each patient is classified into a discrete category according to body temperature; all patients classified in a discrete category are the frequency of that discrete category; the frequency of each particular discrete category is its raw score; the empirical probability of each discrete category equals its raw score over the total.

10.5.3.3.6. If the universe of infinite subjects or options is transformed into a study of limited options with discrete categories, the object of study becomes a study of a universe limited to discrete categories with the aim of increasing the normal positive

Level of Bias of *the ideal discrete category—in this case, low-intensity body temperature below thirty-seven-and-a-half degrees*. Thus, the object of study is no longer equality of opportunity; by changing the approach, the objectives and ideals are transformed. Therefore, in a model limited to discrete categories, if there is a single ideal category in the whole N—the body temperature below thirty-seven-and-a-half degrees—one should study the trend toward the ideal using Validity of Positive Bias and the Critical Sample Level of Bias.

10.5.4. Bias studies in experimental models—whether positive bias or negative bias

10.5.4.1. Impossible Probability is a model of statistical probability—or statistics of probability—because it studies what happens in chance and in history.

10.5.4.2. Science is an activity and intervenes in the chance of events through scientific activity; one type of scientific activity is the experimental method.

10.5.4.3. Since Roger Bacon and Francis Bacon, the experimental model is based on *controlling reality by introducing experimental variables*.

10.5.4.4. *The purpose of the experimental variable is to produce changes in the reality under experimentation*. Change in reality is measured as quantitative changes in events; in statistical probability—or statistics of probability—Impossible Probability, changes in events are measured in terms of probability.

10.5.4.5. Individual statistical probability—empirical probability—will equal the quotient of the raw score or frequency of that individual subject or option over the sum of all raw scores or frequencies of all subjects or options, always taking negative integers in absolute value in sums and probabilities.

10.5.4.6. The hypothetical probability that all subjects or options should have, if all individuals had the same chances, is the inversion of N—in all possible kinds of universes, whether universes of infinite subjects or options or of limited options—the theoretical probability of equality of opportunity at random.

10.5.4.7. The changes studied by statistical probability are changes in individual behavior. One intrameasure way of studying individual behavior is by studying the difference between empirical probability and theoretical probability—the normal Level

of Bias—and, at the sample level, the Mean or Standard Deviation. In bias studies, the ideal is for empirical probability to differ as much as possible from the theoretical one: in positive-bias studies, to increase the positive bias of that ideal subject or option (or those ideal subjects or options); in negative-bias studies, normally to increase negative bias.

10.5.4.8. To study the increase or decrease in bias of raw scores or frequencies from the standpoint of statistical probability—or statistics of probability—Impossible Probability, one must begin with what constitutes a valid model of bias.

10.5.4.9. If we flip a *coin* repeatedly, the number of flips equals the total frequency. Of that total frequency, part will be the frequency of heads—the raw score of heads—and the part that is the frequency of tails is the raw score of tails; and if the probability of heads and the probability of tails are the same, the coin is said not to be rigged: there are equal chances of *heads or tails*—the inversion of N—hence a distribution of random biases, equality of *opportunity*.

10.5.4.10. However, if in a *maternity* ward a greater number of male births than female births is observed, or vice versa—more girls than boys—and the theoretical normal would be the same probability, and out of every thousand births the probability of being a boy or girl is higher than the probability of being the other, it is said there is a biased distribution.

10.5.4.11. If in descriptive bias models one studies the biased distribution of reality—the random biases in nature—by comparing empirical behavior with the hypothetical statistical norm (theoretical central tendency), in experimental models one does exactly the same, except that in experimental models the distribution of bias must morally be the *product of the experimental variable*, so that a causal attribution is established between bias *and the independent variable*—attributing to the experimental independent variable the sufficient cause of bias—if there is sufficient rational tendency to validate the empirical hypothesis, in order to morally transform into truth the hypothesis of empirical causation, provided it is critically rational.

10.5.4.12. *The experimental model in bias studies will aim to manipulate reality* in order to achieve a bias—positive or negative—in the empirical distribution, in favor of the

positive or negative bias that the experimental model sets as the scientific hypothesis ideal of science policy.

10.5.4.13. Experimental bias models in universes of infinite subjects or options

10.5.4.13.1. Experimental positive-bias models in universes of infinite subjects or options

10.5.4.13.1.1. Given a sample of N subjects or options drawn from a universe of possible infinite subjects or options, one wants to know which of the N subjects or options—based on the modification of a dependent variable through the manipulation of an experimental variable—comes to have the greatest empirical probability.

10.5.4.13.1.2. Within this type of model, one must distinguish between models under conditions of maximum possible dispersion and models under omega conditions.

10.5.4.13.1.3. Maximum-possible-dispersion models are those in which, given a sample of N from infinite subjects or options, the ideal is that the sample tends toward the Maximum Possible Theoretical Mean Deviation or the Maximum Possible Theoretical Standard Deviation, which would imply that one subject or option among the N subjects or options tends toward the Maximum Possible Empirical Probability—probability one—and therefore toward the Maximum Possible Theoretical Bias—the difference between one and the inversion of N—and thus necessarily toward the Maximum Possible Empirical Bias.

10.5.4.13.1.4. The condition of possibility, in this model, for tending toward maximum possible dispersion is that, out of the entire N, there exists only a single ideal subject or option; in other words, that there be N minus one subjects or options that are non-ideal or whose ideal is to tend toward increasing negative bias.

10.5.4.13.1.5. However, situations may arise in which, out of the entire N, there is more than a single ideal subject or option—or that tends to have maximum empirical probability "p(xi+)"—such that, provided the number of ideal subjects or options whose empirical probability is to be increased is between two and N minus one (i.e., a number of ideal subjects or options greater than one and less than N), it will be defined as a

model under omega conditions, insofar as the subset of ideals between two and N minus one is called the omega subset, Ω.

10.5.4.13.1.6. The main difference between a maximum-possible-dispersion model and an omega model is that, while in maximum-possible-dispersion models the ideal would be that only a single subject or option be different from zero, in omega models the ideal is that the subjects or options different from zero be a number between two and N minus one; insofar as if only one were the possible ideal it would tend toward maximum possible dispersion, and if the ideal were that the entire N be equal among itself it would be a model of equality of opportunity.

10.5.4.13.1.7. In any case, these types of models—whether only a single subject or option out of the entire N is the ideal (hence different from zero), or out of N there is only an omega subset that alone comprises the ideals (hence different from zero)—are models that will have their most practical applications in universes of limited options rather than in universes of infinite subjects or options.

10.5.4.13.1.8. The reason this sub-section on experimental positive-bias models in universes of infinite subjects or options is included is that, although it is not typically a model for infinite subjects or options—being more characteristic of limited-options models—one cannot rule out the possibility that such models may arise in certain studies. It is therefore an option that should be noted: the possibility of studies of maximum dispersion or ideal omega dispersion, if certain conditions obtain—namely, that within N there is a single ideal subject or option; or, in an omega model within universes of infinite subjects or options, that there is a number of ideals in N between two and N minus one.

10.5.4.13.1.9. The reason why this type of study is more characteristic of universes of limited options is fairly obvious: if, after an environmental awareness campaign (independent variable), a questionnaire is administered on the degree of social awareness (dependent variable)—a questionnaire that asks citizens whether they recycle, do not recycle, or don't know/don't answer—the only ideal option would be the recycling option. If, in addition to recycling, other ideal *ecological* options are included and respondents can select more than one option—for example, not buying

unnecessary products, not generating unnecessary waste, respecting the environment, together with the previous options—such that the number of ideal options is greater than one but less than N, it would be a model comprising an omega subset, Ω, of ideals. However, if all N options were equally ideal, it would be a model of equality of opportunity; or, if some options were more effective for the environment than others, it would be a model of Effective Distribution.

10.5.4.13.1.10. If, in a universe of limited options, only a single option is ideal—for example, in a conflict-resolution study, a survey includes the attitudes: attitude of dialogue, violent attitude, indifference or apathy toward the conflict, don't know/don't answer—the ideal would be the "attitude of dialogue," which should tend toward the Maximum Possible Empirical Probability, hence toward maximum dispersion. But if, in addition to "attitude of dialogue," other ideal options are included and the respondent can select more than one option simultaneously—attitudes such as: *cooperation* between the parties, negotiation, seeking help or mediation—together with the attitudes: dialogue, violence, indifference or apathy, don't know/don't answer; since there is a subset of ideal options—in this case, attitudes of dialogue, cooperation, negotiation, seeking help or mediation—it would be an omega model.

10.5.4.13.2. Experimental negative-bias models in universes of infinite subjects or options

10.5.4.13.2.1. In a modern robotics company of the future, new replicant robots are being designed to carry out mineral-resource extraction on planets in other galaxies. To increase robotized mining productivity—and within ***Taylor's model of scientific time***-and-motion study—the company's policy has decided to design an experimental *program* to determine, for each robotic activity required in planetary mining, how to save the most time in operations per minute for each replicant robot, in order to reduce wasted time and increase productivity. The application of Taylor's scientific policy to robotic mining operations in distant galaxies.

10.5.4.13.2.2. Several experimental robot models are created, and the aim is to determine which experimental model can reduce the time taken to carry out its

operations. The raw score or frequency is therefore time, and each subject or option among the different experimental models is each experimental robot.

10.5.4.13.2.3. Thus, the object of study is to reduce the raw scores or frequencies of the time each robot takes to carry out its operations per minute. Obviously, this is a negative-bias model: the robot with the lowest empirical probability—i.e., the lowest possible raw time divided by the sum of the raw times for all robots—if equal to the minimum possible empirical probability, will be the robot with the highest normal negative Level of Bias and will therefore be the model robot for space-resource exploitation.

10.5.4.13.2.4. The study proposed here is a study model in a universe of infinite subjects or options: among the possible infinite robots that could be used for the experimental model, a sample of possible robots has been selected. For each possible robot, its empirical probability of minutes per operation performed will be measured; the model robot will be the robot model that has the lowest empirical probability—hence, a negative-bias study in universes of infinite subjects or options.

10.5.4.13.2.5. Insofar as all robots will tend to decrease their raw scores or frequencies, but not equally, the ideal is to determine which robot model performs its functions in the least necessary time. This is a study of which robot model has the greatest negative bias, not of reducing raw scores or frequencies under equality of opportunity.

10.5.4.13.2.6. If the object of study were to reduce equally, in all robots, the time spent on operations, then we would be in a model of decrease in raw scores or frequencies under equality of opportunity, in a moderate form, given that it is impossible for a sample of this nature to have a raw score or frequency of zero: at most, times can be moderated, but some time—however minimal—will always be needed. In the particular case presented here, the competition among robots to show which is the fastest at reducing the time taken for their functions is a negative-bias study; there cannot be an empirical probability of zero, because however fast a robot is, it will always need some time, even if it is the minimum possible.

10.5.4.13.2.7. The robot with the lowest empirical probability—the minimum—the most competitive by having the lowest raw time per activity, the robot that takes the

least time to perform its activities, will be the robot with the greatest negative bias in operations per minute, which in this type of study becomes the ideal objective: reducing times in order to increase the productivity of the subject or option.

10.5.4.13.2.8. For the robot with the minimum empirical probability—the highest negative Level of Bias—to be, at the individual level, sufficiently rational in coherence with the policy's ideal objective, the negative bias must be tested, for example by means of the Validity of Negative Bias, although in section eleven—within the equifinality that characterizes Impossible Probability—other rational-critique models may be selected, among which, depending on the study approach, science policy must decide:

Validity of Negative Bias =

$(1/N – p(xi)) – p(xc)$ = zero or positive → negative bias is accepted

$p(xc) = 1/N \cdot (X : 100)$

X = percentage of reliability

10.5.4.13.2.9. Suppose *the ideal robot has been found*; the question arises whether the differences in bias are the product of a true individual tendency—directly due to the independent variable (the improvements introduced in that robot)—or the product of random error owing to sample size.

10.5.4.13.2.10. *Imagine for a moment that we have found, a priori, the ideal robot* insofar as the Validity of Negative Bias is zero or positive. However, this does not guarantee that the results were not a product of mere chance.

10.5.4.13.2.11. To rule out that the results are a product of random error due to sample size, sample-level tests can be performed—for example, the Critical Sample Level of Bias—in order to demonstrate that there is sufficient dispersion at the sample level.

10.5.4.13.2.12. However, in a competition model to increase or reduce a magnitude—where all subjects or options aim to be the maximum or minimum empirical probability—the bias produced does not have to increase empirical dispersion significantly. In a competition, a subject or option may show a slightly greater or smaller tendency than the others by fractions of a unit in the raw score, which statistically may not represent a significant increase in bias in empirical probability, and may even be the subject or option with the highest or lowest empirical probability without necessarily being zero or positive in Bias Validity, Positive or Negative. At an Olympic Games, an athlete can break a world or Olympic record by mere thousandths, and yet not necessarily produce a Mean or Standard Deviation among the set of trial measurements that is equal to or greater than a critical probability. *There are models—especially in competitions—where a subject or option can stand out above the others by mere thousandths, decisive for victory, although statistically insignificant*.

10.5.4.14. Experimental bias models in universes of limited options

10.5.4.14.1. Experimental positive-bias models in universes of limited options

10.5.4.14.1.1. Experimental positive-bias models in universes of limited options under normal conditions—that is, where dispersion can range between zero and maximum—are those in which, of the N possible options, only a single option is ideal for increasing the empirical probability. If there is more than one ideal option—between two and N minus one—this falls within omega models (explained later). The difference between maximum-dispersion models—those in which the whole N comprises only a single ideal option—and models that include an omega subset of ideal subjects or options between two and N minus one is that, while in maximum-dispersion models the ideal is that the raw score or frequency of that single ideal subject or option should equal the total frequency, in omega models that comprise an omega subset, Ω, within N (between two and N minus one), and where all subjects or options in Ω are equally ideal, the ideal would be for the model's entire total frequency to be distributed equally among the

subjects or options in the omega subset within N, so that all the other non-ideal subjects or options have a raw score or frequency of zero.

10.5.4.14.1.2. A ***simple example*** of an experimental positive-bias model in universes of limited options with a ***single ideal option***, tending toward maximum dispersion.

10.5.4.14.1.2.1. Suppose a group of *Non-Governmental Organizations, in order to improve the quality of life of populations at risk of social exclusion for racial or ethnic reasons, carries out a sensitization campaign* against racist and xenophobic attitudes. To this end, they conduct a questionnaire in different cities to make an initial assessment of the distribution of racism and xenophobia in society, administering the questionnaires in places with different distributions of social classes and racial or ethnic minorities. At the end of the study, the NGOs detect that in certain strata or segments of society there is a higher incidence of racist and xenophobic attitudes, and therefore decide that these social sectors should be the main recipients of the sensitization *program* to promote racial and ethnic integration and tolerance.

10.5.4.14.1.2.2. At the end of the sensitization campaign to promote ethnic and racial integration and tolerance, the NGOs again administer questionnaires—but this time only to those social sectors *targeted by the program*—in order to study whether there have indeed been positive effects. The questionnaire consists of several multiple-choice questions, among which the respondent must select the one they identify with. The questions would be of the type, for example: "Should the social and *human rights* of immigrants and people of different race or ethnicity be respected?"; "Should marriage between people of different ethnicity or race be perceived positively?"; "Does ethnic and racial integration foster social development?" For each of these questions, the options provided by the questionnaire would be, for example, "yes," "no," "don't know/don't answer," where, logically, for each question there is ***only a single ideal option***—for example, that "yes," the social and ***human rights*** of immigrants and people of different ethnicity or race should be respected; that "yes," mixed marriages between people of different ethnicity or race should be perceived positively; or that "yes," ethnic and racial integration promotes social development. Insofar as each question has only a single ideal option, the ideal would then be that, for each question, the distribution of response frequencies be such that the ideal answer "yes"—regarding respect for social

and human rights, mixed marriages, and integration as a factor in social development—be the only option that, in each question, tends to have the Maximum Possible Empirical Probability (probability one), and thus tends toward the Maximum Possible Theoretical Bias; therefore the model, for each question, would tend toward the Maximum Possible Theoretical Deviation, Mean or Standard, such that one should apply the Validity of Positive Bias and the Critical Sample Level of Bias to each ideal option in each question.

10.5.4.14.1.2.3. Validity of Positive Bias for each ideal option in each question. The empirical probability of each ideal option, in each question, individually, would be the number of times that individual option was selected in the tests divided by the total number of respondents—the total frequency.

$(p(xi) – 1/N) – p(xc) =$ zero or positive → positive bias of the ideal option is accepted

$p(xc) = (1 – 1/N) \cdot (X : 100)$

X = percentage of reliability

10.5.4.14.1.2.4. Critical Sample Level of Bias for each ideal option in each question [we have applied Validity of Positive Bias for the ideal option individually in each individual question in the test, now we need to test the empirical dispersion of all options included in each individual question, testing the empirical dispersion of all the options in each question against the critical reason, and this is done individually in each question isolated].

DM – p(xc) = zero or positive → bias of the ideal option is accepted

$$p(xc) = \{ [(1 - 1/N) \cdot 2] : N \} \cdot (X : 100)$$

X = percentage of reliability

10.5.4.14.1.3. A more complex example of an experimental positive-bias model in universes of limited options

10.5.4.14.1.3.1. *Let us return to the example of the intelligence-development program*, which at first was treated as a type of universe of infinite subjects or options, insofar as *there may be infinite students* in a possibly infinite history.

10.5.4.14.1.3.2. In a possibly infinite history, the subjects or options can be infinite. In a possibly infinite history, the possible raw scores or frequencies can likewise be possibly infinite; in a possibly infinite human history there may exist infinite men and women; in a possibly infinite history one could, in theory, *flip a coin* infinitely many times.

10.5.4.14.1.3.3. Statistical probability—or statistics of probability—is the study of what happens in history and chance, and in a possibly infinite history a finite being knows history only partially.

10.5.4.14.1.3.4. However, any sample from a universe of infinite subjects or options can be transformed into a universe of limited options by *transforming the sample of subjects or options, N, into the total frequency, ∑xi* [***this idea is crucial in the collaboration process***], of a possible universe of limited options with discrete categories, where the ***frequency in each discrete category is the raw score***, and the empirical probability is the quotient of the particular raw score or frequency of each category over the total raw scores or frequencies of all categories [if a group of students do a test, the score of every student is treated as a subject or option, but in limited options, the score of every student is the raw score to be ***classified*** within the categories].

10.5.4.14.1.3.5. If, in a company of the future devoted to manufacturing replicant robots, one wishes to reduce the number of errors per robot on the industrial line, one way to study errors is to study directly the sample of subjects or options—the sample of robots within the possible universe of infinitely many possible robots—by studying the empirical probability of error for each robot individually; or, simply, to transform a study on a sample of subjects or options (robots) from a universe of infinitely many subjects or options (infinitely many possible robots) into a study in a universe limited to discrete categories—robots with errors or robots without errors—in which one could even construct discrete categories on the basis of creating ***discrete categories according to so many errors per discrete category***; for example, a discrete category of zero errors; another discrete category from one error to so many errors; another discrete category from so many errors to so many others; another discrete category from so many errors to so many others, and so on until completing the maximum limit of errors at the upper bound of the last discrete category, setting rationally for each discrete error category a lower limit and an upper limit of errors for each discrete category ***in a rational way***.

10.5.4.14.1.3.6. ***A teacher who has developed an experimental program for intelligence development can likewise create discrete categories of IQ*** in order to

measure—via an ***intelligence test***—***how the program*** to develop ***cognitive capacity*** has ***improved intelligence***.

10.5.4.14.1.3.7. For example, before applying the experimental model and before any prior measurement, the teacher draws up the following sample distribution of discrete categories: a first discrete category could consist of all IQs below seventy—where the teacher expects there to be as few students as possible, or none—which would be the category of students with intellectual *learning difficulties*; another possible category would be IQ seventy to eighty-nine; another IQ category would be ninety to one hundred and nine; a category of one hundred ten to one hundred twenty-nine IQ; and finally a category of one hundred thirty and above [in case of Superintelligence, we are going to need new models of intelligence test with higher scores, but these intelligence test must be created by an AI similar to that one we are going to test, in other words, *an inferior intelligence, human intelligence*, is not going to be able to test a *superior intelligence, Superintelligence,* therefore, as long as AGI evolves, AGI needs to create the next generation of intelligence test for the next generation of intelligence, and the next generation of intelligence will create a new series of tests for the following generation, and so on. At this point, I would say, right now, humans are not in control of AI anymore]. Based on this discrete categorization of IQs, in the first measurement—or initial assessment—***the teacher administers an intelligence test to the students***, on the basis of which the frequency of each discrete category among the students is calculated. In the first measurement, or initial assessment, the teacher observes a random distribution of students around IQ ninety to one hundred and nine, perhaps some students between one hundred ten and one hundred twenty-nine, perhaps some below seventy, but none at or above one hundred thirty.

10.5.4.14.1.3.8. In accordance with the distribution of discrete categories, the teacher applies the experimental method: the *experimental variable will be the intelligence-development program* applied exclusively to an experimental group, in order to study whether ***the program is sufficiently rational*** to achieve improvements in the development of intelligence in students of similar characteristics. The teacher's empirical hypothesis is that, at the end of the program, the normal positive Level of Bias will increase for the discrete category of IQ from one hundred ten to one hundred

twenty-nine, although as a positive side effect it may facilitate the inclusion of students in the one hundred thirty or higher category—which, while not the objective, would be considered a positive phenomenon of the program's potential if it occurs.

10.5.4.14.1.3.9. At the end of the experimental process, a second measurement—or final assessment—is made: an intelligence test is administered a second time, varying some questions or items but maintaining the test's level of complexity or difficulty.

10.5.4.14.1.3.10. The objective of the study is that, if the highest frequency in the first measurement lies in the discrete category between ninety and one hundred nine, then by the end of the program the highest frequency of IQ should be located around one hundred ten to one hundred twenty-nine [or at least the frequency in this category should be a bit higher compared with the first test before the program].

10.5.4.14.1.3.11. In this type of study, therefore, there has been a ***transformation*** from a model of IQ growth under equality of opportunity in universes of infinite subjects or options to a study model of positive bias in universes of limited options, where the limited options will be the options limited to discrete IQ categories, and where the frequency of each discrete category will equal the frequency of students whose IQs fall within each discrete category. The number of students with an IQ within a discrete category will be the frequency of that discrete category in the student sample; the frequency of that discrete category will be the raw score of that discrete category. The empirical probability of each discrete category equals the raw score of each discrete category divided by the sum of all raw scores of all discrete categories.

10.5.4.14.1.3.12. If under normal conditions students cluster around IQ one hundred, the experimental method aims that, by the end, the frequency of students between IQ one hundred ten and one hundred twenty-nine increases, with it being viewed positively that the most advanced students reach an IQ of one hundred thirty or more.

10.5.4.14.1.3.13. The study model carried out by arranging discrete categories of IQ frequencies—establishing a priori the lower and upper limits of each discrete category and distributing students by category according to the test—would be a study in a universe of limited options with discrete categories to study the increase of positive bias in the category of IQ one hundred ten to one hundred twenty-nine, while accepting

as positive any increase in the one hundred thirty-or-more category. Since the rational critique, on maximum possible dispersion, is established on the hypothesis that maximum dispersion occurs only if a single subject or option tends to be different from zero, the following alternatives would apply for the model's rational critique:

10.5.4.14.1.3.14. Set as the ideal that in the second measurement the empirical probability of the discrete category of IQ one hundred ten to one hundred twenty-nine increases so that it has the greatest positive bias, and, with a sufficiently stringent reliability percentage X, apply Validity of Positive Bias and Critical Sample Level of Bias—admitting a margin of error of the experimental method that includes all students who do not reach the described ideal IQ, for whatever reason: lack of personal motivation, family problems, lack of study habits, or students who, having made an effort, have improved but have not reached the group objective—and also include within the margin of error those students who reach an IQ of one hundred thirty or more, since they exceed expectations (they are evaluated positively) but are encompassed within the error percentage in order to accept a more modest empirical hypothesis that is attainable by a broad majority.

10.5.4.14.1.3.14.1. Another option, in order to create conditions of maximum possible dispersion, would be to merge the one-hundred-ten-to-one-hundred-twenty-nine category and the one-hundred-thirty-or-more category into a single ideal category of IQ one hundred ten or higher—which would include students with high abilities—a single ideal category of IQ one hundred ten or higher that is different from zero under conditions of maximum possible dispersion.

10.5.4.14.1.3.15. To study that a normal positive Level of Bias has indeed occurred in the category whose empirical probability is to be increased—whether the one-hundred-ten-to-one-hundred-twenty-nine category, or that single one-hundred-ten-or-higher category that likewise includes students with high abilities—verify that a normal positive Level of Bias has occurred by means of Validity of Positive Bias:

Validity of Positive Bias =

(p(xi) – 1/N) – p(xc) = zero or positive → positive bias is accepted

p(xc) = (1 – 1/N) · (X : 100)

X = percentage of reliability

10.5.4.14.1.3.16. If it has been established, via Validity of Positive Bias, that the positive bias is truly an individual bias of the targeted category, we then need to know whether this individual bias demonstrated by the Validity of Positive Bias is an individual positive bias attributable to the experimental variable—and not the product of random error due to sample size—for which the Critical Sample Level of Bias is applied.

10.5.4.14.1.3.16.1. Critical Sample Level of Bias, applying Mean Deviation, DM, since for now it is the one for which the logic of the critical probability for this test has been explained:

DM – p(xc) = zero or positive → bias is accepted

DM= Mean Deviation

p(xc) = { [(1 – 1/N) · 2] : N } · (X : 100)

X = percentage of reliabilit

10.5.4.14.1.3.17. Another approach to this study would be Effective Distribution, ordering the discrete categories in ascending order of IQ, with the first being the category below seventy IQ and the last the category of IQ equal to or greater than one hundred thirty. The higher the average effectiveness, the greater the effectiveness of the intelligence-improvement program, as will be explained in section twenty-two.

10.5.4.14.2. Experimental negative-bias models in universes of limited options

10.5.4.14.2.1. *Once again, let us return to the example of the future company that wants to reduce errors per robot*.

10.5.4.14.2.2. Previously, this model—the reduction of errors per robot—was studied in a universe of infinite subjects or options, such that the empirical probability of a subject or option equaled the frequency of errors per robot over the sum of all errors. It was concluded that if all raw scores or frequencies are zero, the sample is an all-zero sample—hence Mean or Standard Deviation (***DMoS) equal to the inversion of N***. If a significant portion of subjects or options have probability zero but a tiny portion have empirical probability different from zero, then the greater the reduction of raw scores or frequencies—so long as empirical probability is not zero across the entire sample—, as the subset of nonzero raw scores or frequencies shrinks, the Mean or Standard Deviation will tend to increase.

10.5.4.14.2.3. But if, instead of studying the sample of errors per robot (individual errors over total), this model is transformed into a study of discrete categories—ordering the distribution into discrete categories of so many-to-so-many errors per robot, and so on—and, depending on the number of errors, a particular robot becomes part of the frequency of the corresponding category, the universe changes. It is no longer one of infinite subjects or options; the universe becomes one of limited options. And the object of study is no longer the reduction of errors per robot under equality of opportunity, because transforming the universe transforms the object, which in turn could be studied in different ways: either as a study of increasing the positive bias of the ideal discrete category with no errors, or as the ideal study of increasing negative bias in non-ideal categories insofar as they exhibit some number of errors—thus increasing the normal negative Level of Bias of those discrete categories associated

with a given number of possible errors. Suppose we construct discrete categories: one category consisting of the frequency of robots with no errors; another category of robots with between one and nine errors; another category of robots with between ten and twenty-nine errors; a category of robots with between thirty and fifty-nine errors; another category of robots with between sixty and ninety-nine errors; and, finally, a category of robots with one hundred or more errors.

10.5.4.14.2.4. According to the error category per robot, each robot is placed in one category or another, forming part of that category's frequency. The number of robots in each category will be that category's particular frequency, the total frequency will be the total number of robots, and each category's frequency will be that category's raw score [in other words, and this is important in the collaboration process in Gaia, subjects are transformed into frequency].

10.5.4.14.2.5. This study—inasmuch as it is a study of the *evolution of the categories* that entail a given number of errors per robot toward categories whose raw score or frequency tends to zero—means that each category that entails a certain number of errors in robot manufacturing should tend toward zero robots with an error magnitude within that category's bounds. The categories that contemplate the following lower and upper bounds of errors per robot—between one and nine errors, between ten and twenty-nine errors, between thirty and fifty-nine errors, between sixty and ninety-nine errors, and one hundred or more errors—should be categories which, insofar as they are defined as non-ideal by contemplating some number of errors per robot (or are defined as categories whose raw score or frequency ought to be zero when the ideal is zero errors in categories that include some number of errors), should have Validity of Negative Bias equal to zero or positive.

10.5.4.14.2.5.1. Validity of Negative Bias

(1/N – p(xi)) – p(xc) = zero or positive → negative bias is accepted

p(xc) = 1/N · (X : 100)

X = percentage of reliability

10.5.4.14.2.6. Thus, if the *study focuses on the evolution* toward empirical probability zero of those non-ideal categories (by contemplating a given number of manufacturing errors), or of categories whose empirical probability ought to be zero (such that their Validity of Negative Bias should be zero or positive), then, conversely, if the study's approach is shifted to *the* ***evolution of the ideal*** empirical probability of that single ideal category that includes only ***robots with zero manufacturing errors***, the study should focus on how the Validity of Positive Bias of the ideal category of error-free robots should be Validity of Positive Bias equal to zero or positive for that ideal category in which all error-free robots are grouped.

10.5.4.14.2.6.1. Validity of Positive Bias

$(p(xi) – 1/N) – p(xc) =$ zero or positive → positive bias is accepted

$p(xc) = (1 – 1/N) \cdot (X : 100)$

X = percentage of reliability

10.5.4.14.2.7. And whether it is validated that the non-ideal categories—by containing a certain number of manufacturing errors per robot—tend toward Validity of Negative Bias equal to zero or positive, or whether it is validated that the single ideal category comprising only error-free robots is a single ideal category whose Validity of Positive Bias is equal to zero or positive; insofar as it is validated that the non-ideal categories tend toward Validity of Negative Bias equal to zero or positive and the single ideal category tends toward Validity of Positive Bias equal to zero or positive, then—in order to validate that these individual trends do not stem from random sample-size error, and that they do in fact reflect a trend to extrapolate from the sample toward a provisional universal maximum (statistical inference)—the Critical Sample Level of Bias should be applied, using Mean Deviation (DM) in this example, since the Maximum Possible Theoretical Mean Deviation has been explained earlier.

DM – p(xc) = zero or positive → bias is accepted

DM= Mean Deviation (DM=*Desviacion Media*, in Spanish)

$p(xc) = \{ [(1 – 1/N) \cdot 2] : N \} \cdot (X : 100)$

X = percentage of reliability

10.5.4.14.2.9. In addition, another study option would be the following, via the Impact of the Defect. If the non-ideal categories—by comprising some number of errors—are ordered in ascending severity, with the first category consisting of robots with one to nine errors and the last consisting of robots with one hundred or more errors, another way to study this would be to calculate the individual Impact of the Defect and the Average Impact of the Defect—such that the lower the average defect, the greater the efficacy and efficiency.

10.6. Synthesis of rational critique

10.6.1. One way to study what happens in chance and history is through the statistical method applied to what happens in chance, space, and time. History is what happens in becoming—the dialectical movement of matter—the way being-in-itself makes for itself what lies outside itself; from accident to contingent, from being to being, from contingent to accident; the becoming of chance into bias and of bias into chance. Probability is the study of what happens. Statistics of probability, or statistical probability—Impossible Probability—is the study of what happens in the history of chance, or the chance of history, within the margin of error or contradictions in science

we are willing to accept—empirical skepticism or rational doubt—moral responsibility toward what happens, the true moral truth, reality-in-itself.

10.6.2. What happens in chance and in history may be events—empirical or theoretical, material or ideal, real or hypothetical—in any case, accidents and contingencies of the same history.

10.6.3. Mathematics is the idealization of reality for the realization of the ideal. Mathematical testing is nothing more than a simple testing of ideas—the contrast between the subjective idea of qualitative reality and the theoretical idea of quantitative objective reality. Every test is the rational contrast between reality and hypothesis. Rational critique determines whether the trend of the hypothesis tends sufficiently to zero or positive to be rationally accepted—the rational critique of whether a behavior in history tends sufficiently to be a moral truth, provisionally.

10.6.4. The ideal is that the higher the level of idealization of reality, the greater the isomorphism between reality and the idea. The more abstract the idea, the more concrete it is. The concrete and the abstract are identical because they are opposites: the more elaborated an idea is, the better it corresponds to the concrete objective reality it explains or understands. ***There is not a single law in science so simple as not to be sufficiently abstract***. Impossible Probability is identical to positivism because they are opposites; the *unification of science* [GAI] will depend on the possibility of morally unifying scientific ideology into a reliable *idea of progress*.

10.6.5. Statistics of probability, or statistical probability—Impossible Probability—is the study of what happens in chance and its history, where everything is absolutely inevitable in the true return to the infinite universe [the eternal return, Nietzsche], morally limited to random models of predetermined existence—at least in theory—by the hypotheses that define the options of variable existence.

10.6.6. In statistical probability, the study of what happens in chance: given a sufficient number of random coin tosses, the probability of heads and the probability of tails will tend to be the same—the inversion of N—and at the same time, within chance, the probability of women in society tends to be higher than that of men [women lived longer,

but I remember originally I wrote that there are more men than women, what happened at birth].

10.6.7. If natural chance itself produces a random distribution that is hypothetically explainable by equality of opportunity—when tossing a coin and there being equal chances of heads or tails—and if natural chance itself produces a biased distribution in favor of more women than men in society, then chance is at once the direct cause of a possible distribution of biases being a random distribution—heads or tails on a coin—or of random biases—being male or female.

10.6.8. Chance produces bias and bias produces chance; statistical probability is the study of what happens in chance and history. Within chance in history there are two possible distributions: random distributions—under equality of opportunity, for example heads or tails on a coin—and biased distributions, which produce differences between positive and negative biases—for example, being male or female.

10.6.9. Both the random distribution and the biased distribution—in both cases (heads or tails, male or female)—are products of natural chance. However, socially, in the history of science, there are study procedures to manipulate reality politically, producing political and scientific biases in the distribution of what occurs. All scientific activity is scientifically political—ideological—and *one way to intervene in chance is through scientific activity; one kind of scientific activity is the experimental method*.

10.6.10. In an experimental bias model, the object of study is to determine whether the distribution of biases is an experimental distribution, or biases arising from random error—or error arising from randomness—i.e., from the magnitude of the sample. The way to critique rationally whether the nature of the bias is experimental or a product of chance is by critiquing the trend against a margin of error—or contradictions in science—we are willing to accept in the statistical decision. In an experimental model whose object is equality of opportunity, the aim is to increase the equality of probabilities for all subjects or options—i.e., that all have the same chances of occurring, the same chances of being or existing under equality of opportunity—equal to the inversion of N. In an experimental equality-of-opportunity model, the statistical distribution will be attributed to the experimental variable, provided the sample's

dispersion lies within the margin of error we are willing to accept. In bias studies, positive or negative, the reverse occurs: insofar as the ideal is bias, the ideal is to increase the positive bias of those ideal subjects or options, or to increase the negative bias of non-ideal subjects or options, such that one tests whether the bias distribution is sufficiently reliable.

10.6.11. Normally, one way to study bias or equality of opportunity at the individual level is via Validity (among other rational-critique models explained later). In equality of opportunity, Validity of Equality equals critical probability minus the absolute value of the Level of Bias. In positive-bias studies, Validity of Positive Bias equals the difference of Level of Bias minus critical probability. In negative-bias studies, Validity of Negative Bias tests whether the difference between the inversion of N and the empirical probability is a difference equal to or greater than the critical probability. In each Validity test, the critical probability will be calculated on the basis of the maximum possible observed trends for each Validity model, multiplied by X percent (error or reliability) out of one hundred, according to the critical-ratio models for this kind of test.

10.6.12. Validity, individually, serves only to validate that the subject's or option's trend is real. For example, in a bias study, it validates that an increase in bias—positive or negative—for a subject or option is truly an individual increase in bias. In equality-of-opportunity studies, it establishes that a subject's or option's trend toward equality of opportunity is truly a trend toward equality of opportunity. In positive-bias studies, Validity of Positive Bias only validates that the individual trend toward positive bias is a genuine individual trend. In negative-bias studies, Validity of Negative Bias only validates that there is a genuine individual trend toward negative bias. Validity, individually, thus only validates the individual trend toward the ideal. Once a zero or positive result has been obtained in Validity, it is necessary to show that the individual trend is the product of a true sample-level trend and not due to random error—i.e., the magnitude of the sample. In experimental models, for a true individual trend to be attributable to the experimental variable (the independent variable), it must be the product of a sufficiently rational sample-level trend; therefore, in addition to studying, for example, Validity, a critique of the sample is also necessary—for example, the

Critical Sample Level of Equality or of Bias. It is absolutely necessary to rule out that the individual trend is the product of random error—the magnitude of the sample.

10.6.13. The error of chance or the chance of error—the magnitude of the sample.

10.6.13.1. As the sample increases (sample N or the sample of raw scores or frequencies), biases tend to zero. As the sample decreases (sample N or the sample of raw scores or frequencies), biases tend to increase. A given Validity result may be due directly to the magnitude of the sample and not to the experimental variable.

10.6.13.2. As the sample increases and bias tends to zero, it may occur, in an equality-of-opportunity study, that the absolute value of the Level of Bias is equal to or less than a critical probability; however, this zero or positive result in the difference "critical probability minus absolute Level of Bias" in an equality-of-opportunity study need not be directly caused by the experimental variable, because it may be directly caused by the increase in sample magnitude, from which a trend of the individual dispersion—the normal Level of Bias—toward zero is derived.

10.6.13.3. If, as the sample tends to increase, bias tends to zero, it may happen that an absolute Level of Bias is equal to or less than a critical probability—where the critical probability equals X percent error (out of one hundred) times the difference "one minus the inversion of N"—and yet this absolute Level of Bias is equal to or less than the critical probability solely as a consequence of the increase in sample magnitude and not as a consequence of the experimental variable. Thus, one may critically accept a trend toward equality of opportunity believing it is due to the experimental variable when, in fact, it is due to the magnitude of the sample—the error of chance or the chance of error—the margin of sample-representativeness error accepted by science policy in accepting the sample.

10.6.13.4. In bias studies, the reverse case can occur: if, as the sample tends to decrease, bias tends to increase, then it may happen that, because the sample magnitude is not sufficiently representative—owing to science policy having accepted an excessive margin of sample-representativeness error—the biases in the sample may tend to increase. A sufficient increase in bias in the sample can, because of a high sample-representativeness error, produce a situation in which, in a bias study, the bias

is equal to or greater than a critical probability. Thus, a sufficiently high bias—caused by a sample magnitude that is not very reliable—can turn out to be equal to or greater than the critical probability because of the sample magnitude, and be a bias accepted in rational critique, when in real reality that bias is not morally representative of the subject's or option's true real bias, because it is a product of error introduced by the sample magnitude.

10.6.13.5. Once a trend has been validated via Validity—whether Validity of Equality, Validity of Positive Bias, or Validity of Negative Bias—or via any other individual rational-critique model explained in section eleven, to determine that this individual trend is not the product of random error (the chance of error) of the sample, one must critique the sample-level trend—via the Critical Sample Level of Equality or of Bias, or using the rational-critique models explained in section eleven.

10.7. The transformation of a universe of infinite subjects or options into a universe of limited options with discrete categories

10.7.1. Universes of discrete categories form a particular universe within Impossible Probability, since, in a certain sense, they are the synthesis between universes of infinite subjects or options and universes of limited options. Universes limited to discrete categories will share certain qualities of universes of infinite subjects or options insofar as the magnitude N is variable: the possibility of subdividing any magnitude infinitely would allow one to establish infinite discrete categories, each category acting like a possible subject or option in a universe of subjects or options, insofar as the N discrete categories could tend to infinity; empirical probabilities could then tend to zero, and the Mean or Standard Deviation tend to zero, exhibiting behavior absolutely identical to a universe of infinite subjects or options. The principal quality of universes of infinite subjects or options that the universe limited to discrete categories will share is that, in universes limited to discrete categories, the inversion of N will be the probability of representativeness error of the discrete categories—since, the smaller the number of discrete categories, the less representative the categories are—and, inversely, the difference from one-half (the inversion of duality) minus the inversion of N is the probability of significance error of the discrete categories—since, the larger the number of discrete categories, tending to infinity, the less significant the discrete

categories will be. Therefore, the number of discrete categories must be a magnitude that is at once sufficiently representative and sufficiently significant—a magnitude accepted by science policy. But insofar as it is a universe limited to discrete categories, universes of discrete categories will share many qualities of universes of limited options as the categories tend to be more limited and more significant as options. This ambivalence—sharing some qualities of universes of infinite subjects or options and other qualities of universes of limited options—will make the universe of discrete categories a particular universe that, in certain circumstances, can behave like a universe of infinite subjects or options, while at the same time being understandable and explicable as a universe of limited options, insofar as the categories are in fact statistical options in which to distribute possible reality.

10.7.2. A teacher wants to increase, under equality of opportunity, the intelligence of their students, and designs an experimental model. This same equality-of-opportunity study can be transformed into a study of positive bias of the discrete categories corresponding to the higher IQ categories—the ideal options. If the different IQ levels are ordered into discrete categories, the study of intelligence under equality of opportunity for all students—that all students develop a high intelligence equally—in the possible universe of infinitely many possible subjects or options (students of similar characteristics) can be transformed from an equality-of-opportunity study into a study of positive bias of the ideal discrete categories—those discrete categories of a given possible IQ level that are truly ideal—ideal categories in which, ideally, all students would belong.

10.7.3. A company of the future that produces robots wants to reduce errors, in a study of the trend toward zero errors per robot manufactured, under equality of opportunity for every possible robot in the possible infinite universe of robots that could be made—thus, an equality-of-opportunity study in a universe of infinite subjects or options—which could be transformed into a bias study in a universe of limited options, namely the discrete categories that could be established for errors per robot. In such a study, the ideal is that the greatest sample distribution occur in those categories that ideally have the fewest errors per robot—or in the category of ideal robots with no errors

(positive bias)—and, ideally, that the smallest sample distribution (negative bias) be in the non-ideal categories—those with the greatest number of errors per robot.

10.7.4. *Any equality-of-opportunity study in a universe of infinite subjects or options can be transformed into a bias study in a universe of limited options with discrete categories* [as we said before, this idea is essential for the collaboration process at any level, particular, specific, global].

10.7.5. ***Any study in universes of infinite subjects or options can be transformed into a study in a universe of limited options with discrete categories*** [in other words, any factor, including rational hypotheses as new factors, can be transformed into discrete categories] by establishing discrete categories in which to arrange—into qualitatively different categories—the raw scores or frequencies of the subjects or options. In this way, a study of subjects or options would be transformed into a study of limited options, the limited options being those limited to discrete categories, where the ideal would be to increase the positive bias of the ideal categories.

10.7.6. Transforming an equality-of-opportunity study in universes of infinite subjects or options into a bias study in universes of limited options with discrete categories consists of transforming the sample distribution of raw scores or frequencies per subject or option into the sample distribution of the frequency of each discrete category in the sample. The distribution of the category's frequency in the sample is the discrete category's raw score; the empirical probability of the discrete category will equal the quotient of the discrete category's raw score or frequency over the sum of all raw scores or frequencies of all the discrete categories.

10.7.7. Every magnitude that is divisible into discrete categories is a magnitude that could be subdivided infinitely into infinitely many discrete categories.

10.7.8. Suppose a magnitude—for example, intelligence quotient. Between IQ zero and IQ greater than one hundred thirty, one could make infinitely many discrete categories.

10.7.9. The reason every magnitude is infinitely subdivisible into discrete categories is that every unit of a magnitude can be subdivided infinitely.

10.7.10. In an anthropometric study on the probability of height in a certain Amazonian ethnicity, a team of anthropologists measures all the members of a tribe and, to study which height is most frequent in the ethnicity, they make a table of discrete height categories. The discrete height category with the greatest frequency will be the mode of the height—the maximum empirical probability—the height category with the greatest frequency in the whole sample. Now, the number of discrete categories into which any frequency sample can be divided is infinite: between the height of one meter and the height of two meters one can make infinite categorical subdivisions because the unit—the meter—can be subdivided infinitely.

10.7.11. In a track event, a team of coaches wants to establish which speed marks are most frequent in a sample of runners. Over a series of track events, the speed of each runner is measured in each event, and then, using a table of discrete speed categories, they study which speed is most frequent among the athletes. Now, between any given speed and any other different speed, one can make infinite subdivisions, because the unit of magnitude—meters per second—is a unit that is infinitely subdivisible.

10.7.12. Every magnitude, whatever it may be, is infinitely subdivisible. A company wants to measure the number of errors per product produced daily, for which it creates a distribution of discrete error categories; but, as will be seen when studying the Impact of the Defect, not all errors are equally serious. In a company dedicated to producing replicant robots, an error in the texture of the materials is not the same as an error that may occur in the Artificial Intelligence. The way to weight each error on a weighting unit—as will be measured in the Impact of the Defect—is a unit that can likewise be subdivided infinitely.

10.7.13. Every transformation of the unit of any magnitude into discrete categorical subdivisions is the transformation of the unit of a magnitude into subdivisions previously accepted by science policy. Every distribution of discrete categories over the subdivision of the unit is a science-policy decision about what division into discrete categories should be most objective for the objective study of reality—an objectivity that is, logically, relative to the political ideology of science policy.

10.7.14. A team of anthropologists devoted to anthropometry, who measure the height of every member of a given Amazonian tribe, will take as many measurements as there are members in that tribe.

10.7.15. A team of coaches in track events will take as many individual measurements as there are athletes in each event.

10.7.16. *In a school where the teacher studies IQ, the teacher will take as many individual measurements as there are students to whom the intelligence test is administered*.

10.7.17. In a company dedicated to producing robots, the measurement of errors per robot will be as large as the number of robots included in the daily sample.

10.7.18. *If a number of discrete categories is established that is greater than the total number of individual measurements (total frequency), then N—the number of discrete categories—would be greater than the total number of frequencies (the sample of raw scores or frequencies of the discrete categories)*. For this reason, an excessive number of discrete categories would cause an error in the significance of the discrete categories, since the discrete categories, in that case, would cease to be significant. If the number of individual measurements determines the total frequency—the sample of raw scores or frequencies—then the *Critical Normality Requirement and the Normality Requirement would not be met,* given that, with N as the N discrete categories, if there are more discrete categories than individual measurements (sample of raw scores or frequencies), the inversion of N would be less than the inversion of the total number of individual measurements; the discrete categories would cease to be significant—hence a high significance-error of the categories. If N is greater than the total frequency, in a study of discrete categories, logically the discrete categories cease to be truly significant.

10.7.19. In a measurement—except for those measurements that require zero for every subject or option—in order to guarantee the Critical Normality Requirement or the Normality Requirement, depending on the object of study, any possible distribution of a magnitude into discrete categories in which the number N of discrete categories is greater than the total number of individual measurements (total frequency) is a sample

N of discrete categories that must be rejected for increasing the significance error of the discrete categories. A new distribution of discrete categories smaller than the total frequency—the sample of raw scores or frequencies of the discrete categories—must therefore be drawn up, so as to meet the Critical Normality Requirement or the Normality Requirement. The other alternative option would be, if there are more discrete categories than raw scores or frequencies of discrete categories, to increase the number of individual measurements so that the inversion of the total frequency is equal to or less than—either directly less than, or within a critical probability—the inversion of N. It should be said that in universes of discrete categories, insofar as the frequency of a discrete category is the raw score of that discrete category, the sample of raw scores or frequencies—whose inversion must be less than the inversion of N—is itself the number of individual measurements made, which will be, in total, the total frequency. The total frequency is what must be greater than N in universes limited to discrete categories; the frequencies are then ordered among the N discrete categories according to which discrete category each particular individual measurement falls into, that particular individual measurement being, for the discrete category in which it is included, simply part of that discrete category's frequency.

10.7.19.1. Requisito Crítico de Normalidad (Critical Normality Requirement), studies of positive bias, and equality when an equal frequency greater than one must be distributed in each option

$(1/N – 1/\sum xi) – p(xc) =$ zero or positive → accepted

$p(xc) = 1/N \cdot (X : 100)$

X = percentage of reliability

10.7.19.2. Requisito de Normalidad (Normality Requirement), for moderation studies, or equality when the equal frequency in each option is one

$(1/N – 1/\sum xi) =$ zero or positive → accepted

10.7.20. Science policy must determine the critical ratio in the Critical Normality Requirement on the basis of a reliability percentage X, to determine when the significance error is sufficiently reduced in order to construct significant samples of discrete categories. For this, the sample of raw scores or frequencies must be, in addition to sufficient, significant—which implies Sample Sufficiency for universes of

limited options: critical probability minus the inversion of the raw scores or frequencies, with the critical probability equal to X percent error out of one hundred, and provided it is not for the study of a sample whose ideal is to be an all-zero sample.

Sample Sufficiency of the frequency sample in discrete categories =

$p(xc) - 1/\sum xi$ = zero or positive → accepted

$p(xc) = X : 100$

X = percentage of error

10.7.21. In any case, a sample of N discrete categories that is less than the sample of raw scores or frequencies of the discrete categories—within a reliability margin—insofar as it meets the Critical Normality Requirement, should, in principle, always be acceptable; however, it must be studied whether, even meeting the Critical Normality Requirement, it is a categorical discrete distribution of the magnitude that allows sufficient representativeness of each discrete category. To do so, one should study whether Sample Sufficiency for the inversion of N—proper to universes of infinite subjects or options—could be applied to universes of discrete categories (depending on what science policy decides) to measure representativeness error of the discrete categories, since it is a type of universe that shares, at the same time, qualities of universes of infinite subjects or options.

Sample Sufficiency of sample N in discrete categories =

p(xc) – 1/N = zero or positive → accepted

p(xc) = X : 100

X = percentage of error

10.7.21.1. Another option, in the study of Sample Sufficiency, could be Flexible Sample Sufficiency, which contrasts, relative to a margin of error, Theoretical Flexibility. Since dispersion will be equally dependent on N and on the raw scores or frequencies, one studies whether N is sufficiently representative in relation to the sample of raw scores or frequencies by studying whether the quotient N/∑xi is equal to or less than an ideal critical ratio equal to X percent error out of one hundred—only in universes of limited options. Evidently, this statistical test will be more flexible than the previous ones. [Flexible sample N/∑xi per se is just the opposite of the arithmetic mean].

Flexible Sample Sufficiency in discrete categories =

p(xc) – N/∑xi = zero or positive → accepted

p(xc) = X : 100

X = percentage of error

10.7.22. Through the Critical Normality Requirement one can control the significance of discrete categories via the reliability percentage X, thereby logically reducing the probability of significance error of the discrete categories; and, to determine beforehand whether the frequency sample is sufficient, or whether the selected sample N of discrete categories is sufficient, science policy can rationally critique the inversion of the total frequency and the inversion of N, applying Sample Sufficiency in each particular case; moreover, insofar as this is a universe of limited options, it can critique Theoretical Flexibility via Flexible Theoretical Sufficiency, which is a more flexible model of rational critique. This kind of phenomenon tends to show that the universe of discrete categories is a universe in which qualities proper to universes of infinite subjects or options and qualities proper to universes of limited options both occur.

10.7.23. In principle: the greater the number of subdivisions of the magnitude, the greater the number of discrete categories; the greater the number of discrete categories, the higher the probability that the Critical Normality Requirement will not be met; the higher the probability of not meeting the Critical Normality Requirement, the higher the probability of rejecting the sample of discrete categories—or of necessarily increasing the individual measurements to raise the total frequency so that at least the Critical Normality Requirement is met—although categorical significance would still not be sufficiently guaranteed.

10.7.24. The fewer the subdivisions of the magnitude, the fewer the discrete categories; the fewer the discrete categories, the higher the probability that the Critical Normality Requirement will be met; the higher the probability of meeting the Critical Normality Requirement, the more significant the discrete categories would be—although, as the discrete categories become more significant, they may at the same time become less representative. A discrete category is less representative insofar as it fails to distinguish significant qualitative differences among the subjects or options that make up that category's particular frequency; that is, part of a category's frequency may be composed of different individual measurements that, although in the same discrete category (due to the small number of discrete categories), in reality have significant qualitative differences that are not quantitatively recognized in how the discrete

categories are subdivided. With too few, poorly representative discrete categories, not all possible significant qualitative differences among the different individual measurements that make up each frequency are sufficiently recognized quantitatively [in other words, 1/N measures if the categories are representative, 1/∑xi measures if the total frequency is meaningful, and N/∑xi measures if there is a rational proportion between N and total frequency. In essence, if the samples are representative and meaningful, keeping a rational proportion according to the critical reason "p(xc)", we can make science, otherwise we need more frequency or to rethink the distribution of categories]

10.7.25. One way to control the magnitude N of discrete categories is by increasing the reliability percentage X in the Critical Normality Requirement. As the reliability percentage X becomes more stringent, the variable N must tend to be significant; however, one must ensure that the tendency not to over-subdivide the magnitude does not increase the probability of sample representativeness error (the inversion of N). In other words, the magnitude of N can be controlled via the reliability percentage X in the Critical Normality Requirement, while at the same time the inversion of N must be sufficiently representative. Thus, excessively reducing N as a consequence of increasing the reliability percentage X (in the Critical Normality Requirement) to make discrete categories significant may increase the sample representativeness error of the categories. To control both significance error and sample representativeness error at once, one should use Sample Sufficiency—provided science policy so deems—whether Sample Sufficiency of N (critical probability minus the inversion of N) or Flexible Sample Sufficiency (critical probability minus Theoretical Flexibility).

10.7.26. As discrete categories tend to be reduced, they become more significant, but with an excessively small number of discrete categories the gap between the lower and upper limit of each category grows. The larger the excessive span of categorical limits within a single discrete category, as its bounds diverge more, the more events it will include—even qualitatively different ones—because a span that is too wide between a category's mathematical limits will not recognize significant qualitative differences. If a single category contains even qualitatively different events (as a result of reducing the variable magnitude N by increasing the reliability percentage X in the Critical Normality

Requirement), then representativeness will be lost as N decreases; consequently, as the inversion of N increases, the representativeness error of the discrete categories increases.

10.7.27. The number of discrete categories should be a moderate number—sufficiently significant and representative of the sample of discrete categories.

10.7.28. Excessive subdivision into discrete categories would render the categories themselves insignificant.

10.7.29. Excessive reduction of the discrete categories would prevent distinguishing the sample's true rational trend, by including within a single category qualitatively different events not recognized mathematically because of the excessive width of the categories' lower and upper limits.

10.7.30. The rationale for setting categorical limits—in discrete categories, the span of the limits used to partition the magnitude, as accepted by science policy—must be a rationale that delimits categories in a sufficiently critical way, so as to recognize quantitatively the qualitative differences among events, via discrete categories that are at once significant and representative.

10.7.31. Discrete categories must be both significant and representative at the same time.

10.7.32. Science policy must determine the most objective model of distributing discrete categories over the magnitude—the rationale for the span of the limits—in order to form a sufficient number of representative discrete categories without thereby making them insignificant.

10.7.33. In universes limited to discrete categories, the probability of significance error of the N discrete categories equals one half (the inversion of duality) minus the inversion of N. Since the more N tends to infinity, the more insignificant the discrete categories become, as N increases the categories become more insignificant. One way to control the significance of the discrete categories is by controlling the tendency of N not to be infinite; however, if N is not to tend to be infinite, N must be limited. The greatest possible limitation of N is N = 2; therefore, the probability of significance error

must be equal to one half—or inversion of duality—minus the inversion of N. Since the maximum limit to which N can be reduced is N = 2 (with N ranging from 2 to infinity), the probability of significance error of the discrete categories must be (inversion of duality) minus (inversion of N). The smaller the difference, the smaller the significance error of the discrete categories; the larger the difference, the larger the significance error of the discrete categories.

½ – 1/N = probability of significance error of the discrete categories

10.7.34. However, as N is limited—making categories more significant—the probability of representativeness error of the categories may increase, because the fewer the discrete categories, the less capable they are of representing quantitative reflections of qualitative differences. In studies of universes limited to discrete categories, the probability of representativeness error of the N discrete categories is inversely proportional to N; thus the inversion of N is the probability of representativeness error of the discrete categories in universes limited to discrete categories. The fewer the discrete categories, the greater the probability of sample representativeness error of the discrete categories.

1/N = probability of representativeness error of the discrete categories

10.7.35. The reason we say that, in universes limited to discrete categories, characteristics of universes of infinite subjects or options and of universes of limited options occur simultaneously is that, with N being a variable magnitude in discrete categories, the inversion of N logically fulfills a new error-term function: the probability of error of the discrete categories. Therefore, insofar as the inversion of N—when N are discrete categories—is the probability of error of the discrete categories, the roles it may play in models of universes limited to discrete categories are similar to those it may play in universes of infinite subjects or options.

10.7.36. In theory, the most normal case is that, if a universe of infinite subjects or options is transformed into a universe of discrete categories, the usual study objective is to increase the ideal categories; therefore, positive-bias study will be the most common objective for this study model. In such a case, the inversion of N could be used, should science policy so decide, to test the sample's empirical dispersion; an alternative would be to use Theoretical Flexibility (N over the inversion of the raw scores or frequencies), insofar as it is a universe limited to discrete categorical options.

10.7.37. Depending on the object of study, the objectives, and the ideals, science policy determines the approach to the study of discrete categories, setting a magnitude N of discrete categories that is both significant and representative—so that it is always as objective as possible—to guarantee sufficiently reliable inference within the margin of error at which science policy is willing to accept contradictions in science.

10.7.38. Only that scientific model will be reliable which accepts the smallest possible contradiction between the moral truth-in-itself of the universe and the political moral truth-for-itself that science makes. The smaller the contradiction between morality-in-itself and political morality-for-itself, the greater the isomorphism. ***The future eternity of human life in time rests, essentially, on a pure and simple moral question: the genuine interest science may truly have in truth itself.***